ABSTRACT

Title of Dissertation: THE ASSOCIATION OF CRITICAL THINKING AND PARTICIPATION IN LIVING AND LEARNING PROGRAMS: RESIDENTIAL HONORS COMPARED TO CIVIC/SOCIAL LEADERSHIP PROGRAMS AND NON-PARTICIPATION IN LIVING AND LEARNING PROGRAMS

James Lucas Kohl, Doctor of Philosophy, 2009

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This study explores the association of students' self-perceived critical thinking ability with participation in Residential Honors living-learning programs versus Civic/Social Leadership living-learning programs and non-participation in living-learning programs. The study analyzes data from the 2004 National Study of Living-Learning Programs survey using Multiple Linear Regression. The sample consists of 637 First-Year students from 8 institutions of higher education from across the United States. Findings reveal that self-perceived critical thinking ability is more related to participating in Residential Honors programs than to living in the residence halls and that living-learning program participation serves as an important conduit for college experiences associated with critical thinking ability such as peer interaction, faculty interaction and residence hall climate. The results also show that less than 1% of the variance in self-

perceived critical thinking for is attributable to institutional characteristics supporting the finding of Pascarella and Terenzini (2005) that between-college influences have less of an effect on student developmental outcomes during college than within-college influences. Based on the results, possible explanations for different relationships of self-perceived critical thinking ability among living-learning programs are posed, implications for practice are identified, and suggestions for future research are made.

THE ASSOCIATION OF CRITICAL THINKING AND PARTICIPATION IN LIVING AND LEARNING PROGRAMS: RESIDENTIAL HONORS COMPARED TO CIVIC/SOCIAL LEADERSHIP PROGRAMS AND NON-PARTICIPATION IN LIVING AND LEARNING PROGRAMS

by

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Dedication

For Sarah

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The last seven years brought many changes including new jobs, moving up and down the east coast, buying a home, and the birth of my son. My doctoral program and the process of writing this dissertation were a constant backdrop during this chapter of my life. As I plodded away toward finishing my degree I faced obstacles and distractions, but there were many people who helped me to press on and I am grateful to them for their support.

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Chapter I:

Introduction

Easier access to information, shifts in the types of jobs composing the United States workforce, and the necessity of competing in a global economy have heightened the need for college graduates to develop and utilize critical thinking (Halpern, 1998; Jones et al., 1995; Pithers & Solden, 2000; Stupnisky et al., 2008). The advent and proliferation of the internet provides global access to a wealth of knowledge and information, previously limited primarily to college students (Halpern, 1998; Stupnisky et al., 2008). While access to this information provides opportunities for it to be used for technological advances, critical thinking is needed to utilize this information effectively (Halpern, 1998; Jones et al., 1995; Stupnisky et al., 2007). In addition, as the United States workforce shifts from a manufacturing base to a "knowledge worker" base, those that do not effectively gather information and think critically about it will not be competitive in the evolving workforce (Hunt, 1995). For example, the National Association of Colleges and Employers *Job Outlook 2008 Survey* reported that on average employers rated candidates' ability to exhibit critical thinking skills such as problem solving and analytical skills as extremely important during the hiring process (NACE, 2007). In order for the United States to complete in a more global economy that fosters greater competition between countries, colleges and universities will have to produce students as part of a growing "knowledge workforce" that can critically think (Halpern, 1998; Hunt, 1995; Jones et al., 1995; Pithers & Solden, 2000).

In recognition of the need for a work force that can think critically, a number of stake holders have identified critical thinking as an important college outcome (Jones et

al., 1995; Stupnisky et al., 2007). *The Student Learning Imperative: Implications for Student Affairs* (ACPA, 1994) asserts that college graduates should all demonstrate the ability to critically think. Alexander Astin (1993) supports this assertion by identifying critical thinking as one of the primary aspects of cognitive development in his classification of student outcomes. In addition, United States Presidents George H.W. Bush, William Clinton and George W. Bush have identified enhancing critical thinking as an important priority for higher education (National Education Goals Panel, 2008).

The literature identifies a number of influences in the college environment that enhance critical thinking. They include the following: classroom experiences, collaborative learning (Cabrera, Nora, Crissman, Terenzini, Bernal& Pascarella, 2002; Doyle, Edison & Pascarella; Tsui, 1999, 2001), academic major (Astin, 1993; Gadzella & Masten), faculty and peer interaction (Cruce, Woliniak, Seifert & Pascarella, 2006; Kuh, 1995; Whitt, Edison, Pascarella, Nora & Terenzini, 1999), institutional type (Pascarella, Whitt, Nora, Edison, Hagedon, & Terenzini, 1996; Whitmire, 1996), working in college, participating in clubs and living on campus (Gellin, 2003; Pascarella, Bohr, Nora, Zusman, Inman & Desler, 1993; Schroeder, 1994), and participating in living-learning (L/L) programs (Inkelas, Vogt, Longerbeam, Owen & Johnson, 2006). Two L/L programs in particular, Residential Honors and Civic/Social Leadership programs, have been shown in the literature to be associated with gains in critical thinking ability (Inkelas et al., 2004). Their connection to critical thinking may be due to program characteristics such as faculty and peer interaction and classroom experiences that the literature has also shown to be associated with critical thinking. This study explores the association of students' self-perceived critical thinking ability with participation in Residential Honors

(RH) living-learning (L/L) programs versus student's self-perceived critical thinking ability with participation in Civic/Social Leadership (CSL) L/L programs and non-participation in L/L programs.

The following chapter introduces the concepts of critical thinking, as well as L/L programs and their potential connection. A definition of critical thinking is provided as well as a brief summary of the literature concerning the connection of participation in L/L programs and critical thinking. In addition, Residential Honors (RH) and Civic/Social Leadership (CSL) programs are described as well as a rationale for how their relationships with critical thinking may differ. This chapter also includes a statement of the problem and research question being explored in this study followed by the significance of the study and a brief discussion of the methods used to conduct the study.

Critical Thinking Defined

A number of attempts have been made to define critical thinking (Ennis, 1962; Erwin, 2000; Facione, 1990; Garcia & Pintrich, 1992; Halpern, 1998; Jones et al., 1995; Kurfiss, 1988; Pascarella & Terenzini, 2005; Paul & Nosich, 1991; Siegel, 1980; Watson & Glaser, 1980). In a review of the definitions currently available in the literature, Pascarella and Terenzini (2005) note that all have a cognitive component; however, many of the later definitions in the literature also include an affective aspect of critical thinking. The cognitive component of critical thinking involves the utilization of skills such as problem solving, decision making, evaluation, formulating inferences, interpretation, analyzing data, self directed thinking, deduction, and identifying central issues (Ennis, 1993; Erwin, 1997; Facione, 1990; Jones et al., 1995; Kurfiss, 1988; Paul, 1993; Siegel 1980; Watson & Glaser, 1980). The affective component of critical thinking concerns

the disposition to engage in critical thinking (Ennis, 1985; Erwin, 1997; Facione, 1990; Jones et al., 1995; Paul, 1993; Siegel 1980). Critical thinking disposition has been described as an individuals' inclination or willingness to exercise the critical thinking skills they possess (Facione, 1990; Giancarlo & Facione, 2001; Jones et al., 1995).

For the purposes of this study a definition of critical thinking, based in the work of Facione (1990), Jones et al. (1995) and Paul and Nosich (1991), that incorporates both the cognitive and affective components is utilized. This definition is as follows: critical thinking is the process of making purposeful, self-regulatory judgments through interpretation, analysis, evaluation, inference, and explanation motivated by the disposition to habitually engage in these behaviors.

Living-Learning Programs

Living-learning programs are a type of learning community that have the characteristic that all participants live together in a campus residence hall environment (Lenning & Ebbers, 1999; Shapiro & Levine, 1999). Although L/L programs offerings vary, the following are common characteristics of most L/L programs: participants live together in a residence hall, share an academic or co-curricular experience, have dedicated resources they use in their residence hall, and participate in programming in their residence hall that has social and academic components (Astin, 1984; Inkelas et al., 2004; Inkelas et al., 2006; Inkelas, Zeller, Murphy & Hummel, 2006).

Research shows that participation in L/L programs is connected to critical thinking (Browne & Minnick, 2005; Inkelas, Soldner, Longerbeam & Leonard, 2008; Inkelas, Vogt, Longerbeam, Owen & Johnson, 2006). Some research shows that participants in L/L programs report higher levels of critical thinking ability and

confidence in critical thinking than students who live in residence halls but do not participate in L/L programs (Inkelas & Weisman, 2003; Inkelas, Vogt et al., 2006; Seifert, Pascarella, Colangelo & Assouline, 2007). Differences in self-reported levels of critical thinking ability may be due to increased faculty and peer interaction and greater opportunities for students to engage in critical thinking at a time when students are developing intellectual competence (Pike, 1999; Inkelas, Vogt et al., 2006).

In addition, differences in critical thinking ability between participants in different types of L/L programs is linked to size of L/L program, resources, program oversight, and program focus (Inkelas & Weisman, 2003; Inkelas et al., 2008). Since L/L programs share common characteristics, but may vary greatly in focus, academic orientation, level of faculty involvement, and intensity of experience, it is important to not treat L/L programs as a monolithic group, but rather examine and compare specific types of L/L programs (Inkelas et al., 2004; Pascarella & Terenzini, 2005).

All of these studies employ analysis of variance (ANOVA) or ordinary least squares (OLS) regression statistical techniques. In the studies that use ANOVAs to analyze the data, differences in pre-college characteristics are controlled for through random sampling. In the studies that employ OLS regression to analyze the data, pre-college characteristics and other important environmental characteristics are included in the model. However, only one of these studies includes a measure of pre-college critical thinking ability, while the other two studies use retrospective measures based on students' recollections at the time of data collection.

College impact research concerning L/L program participation is difficult because students are not randomly assigned to groups: instead, they either are selected or they

self-select to participate in L/L programs. As a result, even with random selection of participants, it is unlikely that the L/L program group is representative of all students. In addition, it is very difficult to capture pre-college data on important college impact outcomes such as critical thinking ability. The data collection would need to occur either during high school or just as the first-year begins. These tasks present significant logistical difficulties and as a result researchers often conduct their assessments during students' first academic year. Unfortunately, this lack of a strong pre-college baseline means that differences found between the groups involved in these studies could be due to pre-college characteristics of the students involved in the L/L programs and not the programs. In addition, since some researchers suggest that students' cognitive skills and abilities develop with time and life experiences in addition to the college experience, differences in critical thinking found in these studies may be due in part to influences other than L/L program experiences (Astin, 1993; Chickering & Reisser, 1993).

Inkelas and associates (2004) created a typology of L/L programs containing 13 different L/L program types (See Table 1). These programs differ in several ways including the presence of an academic focus, a co-curricular focus, collaboration with faculty, credit for participation, and participants' age (Inkelas et al., 2004). Differently than the other eleven types of L/L programs, Residential Honors (RH) programs, and Civic/Social Leadership (CSL) programs, have positive relationships with the development of critical thinking skills (Inkelas & Weisman, 2003; Inkelas et al., 2004; Siefert et al., 2007). These programs are similar in that they share the common characteristics of all L/L programs as identified by Inkelas et al. (2004), however their focus is different, as is their approach to the academic experience (Inkelas et al., 2004).

RH programs are defined by Inkelas and Weisman (2003) as living-learning programs that provide "a rigorous academic experience to pre-selected high-talent students through specialized classes taught by affiliated faculty and concentrated coursework in collaborative and creative endeavors" (p. 336). CSL programs are living-learning programs that focus on active participation in political or public service, leadership through community service or service learning, and trying to achieve greater social responsibility (Inkelas et al., 2004). Though the characteristics of these programs vary across institution, these definitions represent the common characteristics of each type.

Table 1

Inkelas' (2004) Typology of Living-Learning Programs

L/L Program Type	
Civic/Social Leadership Programs	Research Programs
Cultural Programs	Residential Colleges
Disciplinary Programs	Transition Programs
Fine & Creative Arts Programs	Upper Division Programs
General Academic Programs	Wellness/Healthy Living Programs
Residential Honors Programs	Women's Programs
Outdoor Recreation Programs	

It is important however to explore the ways in which the L/L programs included in this study match these general descriptions. Table 2 shows how many of the RH and CSL programs in this study include certain experiences. These data show that not all programs match the general description of their type. However, conclusions drawn from this data should be considered carefully since after some investigation the National Study of Living-Learning Programs (NSLLP) program data was found to be inaccurate (K.K. Inkelas, personal communication, 2007).

Table 2

Number of RH and CSL Programs Exhibiting Certain Characteristics

Characteristic	RHP (n=9)	CSL (n=11)
Courses for Credit	3	5
1-5 Faculty Involved	4	5
More than 6 Faculty Involved	2	0
Faculty Teach Courses	6	3
Faculty Academic Advising	6	2
Faculty Mentoring	5	2
Faculty Attend Social/Cultural Gatherings	7	3
Faculty Participate in Service Learning	3	2
Faculty Tutoring	3	1
Students Teach Courses	2	3
Student Mentoring	6	5
Students Attend Social/Cultural Gatherings	6	8
Academic Advising in the Residence Hall	5	8
Courses Taught in the Residence Hall	4	7
Computer Lab in the Residence Hall	3	0
Faculty Offices in the Residence Hall	4	7
Offer Scholarships	3	0
Study Space	3	7
Require Academic Advising	2	0
Require Cultural Outings	1	2
Require Group Projects	1	2
Require Internships	0	2
Require Service Learning	0	2
Require Community Service	0	3
Require Community Building	2	5
Optional Capstone Project	4	2
Optional Career Workshops	4	5
Optional Cultural Outings	7	6
Optional Group Projects	1	3
Optional Internships	5	3
Optional Research Projects	5	2
Optional Service Learning	4	5
Optional Community Service	2	5
Optional Community Building	3	4

Though the definition of RH programs states that they include a rigorous academic experience and the definition of CSL programs does not, only 3 of the 9 RH

programs in this study include a course for credit while 5 of the 11 CSL programs do include courses for credit. Six of the RH programs indicate that faculty teach their courses which may mean that 6 of the RH programs include courses, but not necessarily for credit. The data also seem to show that RH programs more often focus on faculty involvement in academically related activities than CSL programs. Conversely, CSL programs appear to more often emphasize peer interaction through social gatherings and groups projects. In general it is important to note that these data show that not one of these characteristics was exhibited by all programs of either type and that almost all of the characteristics included in Table 2 were exhibited by at least one program of each type. As a result, any proposed explanations for why differences in the relationship between self-perceived critical thinking and participation in RH programs versus participation in CSL programs and non-participation in L/L programs must take this into account.

The literature concerning the relationship of different college experiences to the development of critical thinking ability reveals that certain characteristics of RH and CSL programs including classroom experiences, faculty interaction and peer interaction may account for their connection to critical thinking (Tsui, 1999,2001; Cabrera, Nora, Crissman, Terenzini, Bernal, & Pascarella, 2002; Cruce, Wolniak, Seifert & Pascarella, 2006; Doyle, Edison & Pascarella, 2000; Li, Long & Simpson, 1999; Pithers & Solden; 2000; Kuh, 1995; Whitt, Edison, Pascarella, Nora & Terenzini, 1999; Pike, Schroeder& Berry, 1997). Since, in general, RH programs emphasize curricular experiences and faculty interaction while CSL programs emphasize co-curricular experiences and peer interaction, differences in the relationship of critical thinking and L/L program

participation may be linked to these programmatic differences. A further discussion of the influence of these characteristics and of other aspects of the college experience is discussed in the literature review.

Statement of the Problem

The purpose of this study was to explore the relationship between students' self-perceived critical thinking ability and participation in Residential Honors (RH) living-learning (L/L) programs versus self-perceived critical thinking ability and participation in Civic/Social Leadership (CSL) L/L programs, and non-participation in L/L programs. The research question guiding this study was the following: What is the relationship between different types of inputs and environments and self-perceived critical thinking for students in Residential Honors (RH) programs, Civic/Social Leadership (CSL) programs and students not participating in any L/L programs (NPLL)?

Residential Honors and CSL programs promote interaction with faculty and/or peers, serve as smaller communities, provide opportunities for increased involvement and collaboration, and have either a co-curricular or curricular emphasis. The literature concerning critical thinking shows the factors listed above to be connected with the development of critical thinking in students (Cabrera et al., 2002; Cruce, Woliniak, Seifert & Pascarella, 2006; Gellin 2003; Kuh, 1995; Pascarella, 1999; Pascarella et al., 1993; Tsui, 1999, 2001; Whitt, Edison, Pascarella, Nora & Terenzini, 1999). In addition, Pascarella and Terenzini (2005) show that L/L programs that exhibit the characteristics listed above have more positive effects on student outcomes than programs that do not exhibit these characteristics, or exhibit them to a lesser degree.

As a result, differences in the way RH programs, CSL programs and the experiences of students who live in the residence halls but do not participate in any L/L programs exhibit these characteristics may account for some of the potential differences in the connection of these experiences and self-perceived critical thinking ability of students. It is important to note that not all RH programs and CSL programs are identical. Due to variation in the characteristics among programs of each type, clear relationships of their characteristics with critical thinking can not be identified. In general, RH programs emphasize the classroom connection with faculty and a rigorous curriculum more so than CSL programs, where as CSL programs put more emphasis on experiential work in the field that promotes collaboration, involvement and peer interaction (Inkelas et al., 2004). In addition, students participating in these L/L programs are more exposed to the programmatic characteristics discussed above than are NPLL students (Inkelas et al., 2004). Differences found in the connection between self-perceived critical thinking and participation in RH programs versus CSL programs or non-participation in L/L programs may be due to different programmatic characteristic.

However, continued evaluation of the benefits of L/L programs is necessary to determine their connections to different student outcomes, and also to justify the resources dedicated to support them. The American College Personnel Association (1994) published the *Student Learning Imperative* (SLI) in response to strained economic conditions, the public's desire for greater accountability, and the reduction in the public's confidence in higher education. The SLI challenges student affairs to align its mission and allocation of resources with the mission of the larger university by emphasizing student learning and personal development. As institutions reallocate resources to efforts

that contribute to student learning and development, L/L programs will need to demonstrate their contribution to these goals.

In addition, previous studies have most often involved either a single or multiple L/L programs at a single institution (Inkelas et al., 2004). Due to small sample size or idiosyncratic characteristics of the specific institution or program, the results from these studies can not confidently be generalized. As a result of conflicting findings in the literature and the lack of studies based on multi-institutional data producing results which may not generalize, further research on the connection of participation in L/L programs and critical thinking is needed.

The National Study of Living Learning Programs (NSLLP) data set is used in this study to evaluate the research question. The NSLLP was administered to students at 34 colleges and universities to assess the impact of L/L program participation on student outcomes (Inkelas et al., 2004). By using the NSLLP data set, a comprehensive multi-institutional data set, to further explore the benefits of L/L program participation, this study provides new insight into the association of self-perceived critical thinking and participation in RH and CSL programs.

Significance of the Study

The results of this exploratory study further our understanding of how self-perceived critical thinking ability is associated with the L/L program experience. First, the results show that less than one percent of the variance in self-perceived critical thinking ability is attributable to institutional characteristics. This finding supports previous research that finds that institutional characteristics have less of an effect on

student development outcomes than students' experiences during college (Astin & Denson, 2009; Pascarella & Terenzini, 2005).

The findings of this study also reveal that L/L program participation accounts for a significant and very small portion of the variance in self-perceived critical thinking ability; however, L/L program participation has an indirect effect on self-perceived critical thinking ability associated with peer interaction, faculty interaction and residence hall climate. In other words, the L/L program experiences facilitate peer and faculty interactions and residence hall climates that are associated with higher self-reported levels of critical thinking ability. The findings of this study also show that when all other variables are taken into account, the relationship between self-perceived critical thinking ability and RH program participation is greater than the relationship between self-perceived critical thinking ability and living in the residence halls, but not participating in an L/L program.

Aspects of the RH programs, CSL programs, and not participating in any L/L program are explored that may explain the differences found in the relationship between participation and self-perceived critical thinking. However, because the characteristics of RH programs and CSL programs offered at different institutions vary, and the data do not allow for comparisons along specific characteristics of each program, the conclusions drawn are suggested as the basis for future research (Inkelas et al., 2004).

The study also responds to calls in the literature for additional research on L/L programs to further the understanding of their association with key student outcomes (Inkelas et al., 2006; Inkelas & Weisman, 2003; Inkelas, Soldner, Longerbeam &

Leonard, 2008). In addition, the use of data from multiple institutions allows for greater confidence in the ability to generalize the results of this study.

The outcomes of this study contribute to the debate in the literature concerning the use of Hierarchical Linear Modeling (HLM) versus Ordinary Least Squares (OLS) regression for analyzing multi-campus data sets with institutional and student level variables. This study informs future research by supporting the argument of Astin and Denson (2009) that OLS regression is sufficient for analysis of nested data with higher education data sets.

The outcomes of this study also have implications for student affairs and residential life administrators and thus aid them in the allocation of resources to support and develop co-curricular educational experiences. As administrators make decisions about how to allocate resources in resource scarce environments, they must consider the benefits of each program, experience, or service they provide (National Center for Public Policy and Higher Education, 2007; Browne & Minnick, 2005). Since L/L programs require dedicated resources for purposes such as funding programs, supporting faculty involvement and maintaining space in the residence halls, the contributions of these programs to important student outcomes needs to be demonstrated in order to justify their continued existence (National Center for Public Policy and Higher Education, 2007; Inkelas, Zeller, Murphy & Hummel, 2006).

To date many institutions have relied on their own institutional data or the literature to assess the benefits of the residential environment and to justify the allocation of resources to L/L programs (Astin, 1993; Kuh et al., 1991; Schroeder & Mable, 1994). While their data may be helpful for a particular program or institution, these studies may

not provide information that can be generalized to L/L programs across institutions because of the limitations of small sample sizes and the unique characteristics of particular programs (Inkelas et al., 2004). The results of this study can guide administrators in their justification of the existence of L/L programs, specifically RH and CSL programs, by providing information that substantiates the benefits of the programs, or help to alter programs so they incorporate characteristics that are associated with self-perceived critical thinking ability. In addition, administrators can use this information in the recruitment process to make L/L program participation more attractive to students and parents.

Summary of Methods

Astin's (1993) Input-Environment-Outcome (I-E-O) model is used as the conceptual model to guide this quantitative study. Change is determined by comparing students input characteristics at their time of entry into the institution with their outcome characteristics after they have been exposed to the environment (Astin, 1993). Differences between inputs and outcomes are attributed to the impact of environmental characteristics over time (Astin, 1993). However, because the I-E-O model is longitudinal in nature, and the data in this study are cross sectional, the model is adapted to accommodate the use of retrospective questions to represent student input characteristics (Pascarella, 2001).

Multiple linear regression (MLR) analysis is used to analyze the data in this study. The variables are entered into the regression equation in blocks according to Astin's (1991) I-E-O model of student impact, so the incremental increase in the amount of the variance in the dependent variable could be assessed. The recommendations of Astin and

Denson (2009) are also followed concerning the entering of variables when using ordinary least squares regression analyses to examine the impact of student and institutional level variables on student outcomes. They recommend entering first-year student input characteristics into the model first, followed by institutional characteristics, and then college experiences (Astin & Denson, 2009). The R^2 statistic is calculated to assess how much of the variance in critical thinking is accounted for by each model and the R^2 change or ΔR^2, is calculated to assess how much more of the variance each model accounted for over and above the previous model.

The data used in this study come from the National Study of Living and Learning Programs (NSLLP). The primary purpose of this survey was to assess the impact of L/L program participation on student outcomes (Inkelas et al., 2004). The survey was conducted by Inkelas and associates in the first half of the 2004 spring semester. Thirty-four public and private research institutions participated. The survey is made up of 258 likert-type questions created specifically for it by NSLLP staff. The questions addressed demographics, perceived growth, pre-college expectations, experiences during college, and self-reported student outcomes on a range of topics. The sample was randomly selected and consists of 33,562 L/L program participants and 38,166 students who lived in a residence hall but did not participate in L/L programs. The overall response rate for the survey was 33 % with 12,236 L/L program participants and 11,673 students in the comparative sample completing the survey (Inkelas et al., 2004).

The sample for this study consists of 637 first-year students from eight different institutions. The first-year is used since L/L programs cater largely to first-year students and the literature identifies it as a time when students are developing intellectual

competences such as critical thinking ability (Chickering & Reisser, 1993; Inkelas et al., 2004; Lehmann, 1963). Participants' responses to survey questions concerning inputs and college experiences identified in the literature as influencing critical thinking ability are included in this study. Self-perceived critical thinking ability is assessed through a factor consisting of six questions created by Inkelas et al. (2004).

The primary research question examined the relationship of self-perceived critical thinking ability and participation in Residential Honors programs versus the relationship of self-perceived critical thinking ability with participation in Civic/Social Leadership L/L programs and non-participation in any L/L program.

Summary

Though previous research indicates that there is a connection between participation in L/L programs and critical thinking ability, this study expands that understanding by using data from a multi-institutional data set to examine the relationship of self-perceived critical thinking ability and participation in RH programs versus CSL program participation and non-participation in any L/L programs. However, no cause and effect is determined between L/L program participation and gains in critical thinking ability. Information on these two variables was collected simultaneously during the 2004 administration of the NSLLP. As a result, this study is exploratory in nature, focusing on the connection of self-perceived critical thinking and participation in RH programs, CSL programs and no-participation in any L/L programs and poses possible explanations for differences. The findings of this study help provide direction for future research and provide a preliminary guide for student affairs administrators as they allocate resources to L/L programs at their institutions. The following chapter provides an extensive review of

the literature pertaining to critical thinking and L/L programs. The literature review is followed by a chapter discussing the research methods for this study. The results of the analyses are reported in the fourth chapter, and the final chapter includes a discussion of the findings, suggestions for future research and implications for practice.

Chapter II:

Literature Review

The following chapter reviews the relevant literature concerning the association of L/L program participation and self-perceived critical thinking ability. First, Chickering and Reisser's (1993) model of student development and Baxter Magolda's (1992) model of knowing and reasoning in college are discussed to establish a potential theoretical link between critical thinking and participation in L/L programs. Second, the multiple definitions of critical thinking available in the literature are reviewed, as well as, other college environmental influences on critical thinking ability. Finally, the literature concerning L/L programs and their potential connection to critical thinking ability are discussed.

Theoretical Foundation

Chickering and Reisser's (1993) model of student development identifies seven levels or vectors that students move along in their affective, cognitive and psycho-social development throughout their college career. These vectors include developing competence, managing emotions, moving through autonomy toward interdependence, developing mature interpersonal relationships, establishing identity, developing purpose, and developing integrity (Chickering & Reisser, 1993). Students move along these vectors of development during college from lower levels of ability to higher levels of ability (Chickering & Reisser, 1993). Though students may progress in their development along a number of the vectors simultaneously, the authors suggest an order to the vectors based on which vectors are likely to be encountered early on in college and

serve as a foundation for those that follow (Chickering & Reisser, 1993). The first vector, Developing Competence, concerns the development of physical and manual skills, interpersonal skills and the development of intellectual abilities including competence in critical thinking ability through the development of critical thinking skills (Chickering & Reisser, 1993).

Chickering and Reisser (1993) identify residential living communities as an environment that has an impact on students' development of competence. They believe that residential communities affect the development of competence because they provide students access to other students of diverse backgrounds and attitudes, promote significant interchange between students, allow for the sharing intellectual interests, and the chance to develop a meaningful culture among the residents (Chickering & Reisser, 1993). In addition, Chickering and Reisser (1993) suggest that residence hall staff incorporate learning activities, creating smaller groupings of students, and providing opportunities for interaction that help to foster movement along several vectors including developing competence.

Commonly, L/L programs are defined as groups of students who live together in a distinct part of a residence hall, or whole residence hall, and share a common purpose that serves as a basis for developing a group identity, cohesiveness and the integration of curricular and co-curricular experiences (Astin, 1984; Inkelas et al., 2004). Similarly to Chickering and Reisser's (1993) description of residential living communities that contribute to the development of competencies such as critical thinking skills, L/L programs incorporate learning, promote the exploration of shared interests and purpose among participants, and foster interaction and meaningful connections. As a result,

Chickering and Reisser's (1993) model of student development supports participation in L/L programs as a college experience that may contribute to the development of critical thinking skills.

Baxter Magolda's (1992) work concerning gender related patterns in intellectual development also models the way students' develop intellectual skills throughout college. The ways of knowing in developmental order are: Absolute Knowing, Transitional Knowing, Independent Knowing, and Contextual Knowing (Baxter Magolda, 1992). In addition, two reasoning patterns within each way of the first three ways of knowing are also identified. Students fall on the continuum between the two patterns of reasoning with women more likely to exhibit one pattern and men the other (Baxter Magolda, 1992). The majority of first-year students exhibit the Absolute Knowledge way of knowing, but Baxter Magolda (1992) also found that 32% of first-year students were transitional knowers.

Absolute Knowing is characterized by students' belief that knowledge is certain, and any uncertainty is due to a lack of access to absolute knowledge. They believe that authorities, such as professors, have all the answers, and their role as learner is to obtain knowledge from the authority (Baxter Magolda, 1992). These students tend not to make judgments for themselves, but instead engage in seeking the answers to their questions from authorities.

However, about a third of first-year students, according to Baxter Magolda (1992) have advanced to Transitional Knowing which is characterized by the continued belief that some knowledge is certain, but some is uncertain. Students in this stage of development are no longer focused on recording knowledge, but seek to understand

knowledge. Baxter Magolda (1992) identifies two patterns of reasoning during the Transitional Knowing stage. One is the interpersonal-pattern characterized by students collecting and exposing themselves to others ideas, and making personal judgments to resolve uncertainty (Baxter Magolda, 1992). Women are more likely than men to exhibit this pattern (Baxter Magolda, 1992). The other is the impersonal-pattern which is characterized by students exchanging views through debate, and resolving uncertainly through logic and research (Baxter Magolda, 1992). Men are more likely than women to exhibit this pattern (Baxter Magolda, 1992). Though students may engage in different patterns of thinking, all transitional knowers exhibit aspects of critical thinking such as making judgments based on an analysis of the information gathered through personal interaction or research.

Baxter Magolda (1992) suggests that institutions should create learning environments that match students' ways of knowing, that validates the student as knower, situates learners in their own experiences, and views learning as constructing meaning along with others. Baxter Magolda (1992) identifies residence halls as one of the environments in which students gain confidence in their role as knowers and their ability to construct knowledge. The residence hall environment assists students in this process through an emphasis on individual authority, personal responsibility, responsibility to others, and the opportunity for students to make decisions and work with other students to make mutually beneficial decisions (Baxter Magolda, 1992). L/L programs are residential environments that enhance these beneficial aspects of the residential experience (Schroeder, Mable & associates, 1994). In addition, they provide students the opportunity to explore what they learn in the classroom through their co-curricular

experiences. These opportunities to apply knowledge to real world experiences match transitional knowers need to understand how what they are learning in the classroom is important to them personally.

Both Chickering and Reisser (1993) and Baxter Magolda's (1992) models of student development show that many first-year students are developmentally ready to engage in critical thinking during the first year in college. In addition, college environments, such as those provided by L/L programs, assist in the development of intellectual abilities such as critical thinking ability (Chickering & Reisser, 1993; Baxter Magolda, 1992). As a result, both of these theoretical frameworks support that participation in L/L programs during the first year in college can contribute to the development of critical thinking skills.

Critical Thinking Ability

Defining Critical Thinking

Due to its complexity, defining critical thinking is difficult at best. Many similar but distinct definitions have been proposed (Pascarella & Terenzini, 2005; Tsui, 1998). However, there is enough overlap in the multiple definitions that an acceptable definition of critical thinking can be obtained by examining the various definitions of critical thinking in the literature (Halpren, 1993).

Ennis defines critical thinking as, "reasonable reflective thinking focused on deciding what to believe or do" (Ennis, 1993, p. 180). He argues that throughout this process one needs to: judge the credibility of sources; identify conclusions, reasons and assumptions; judge the quality of an argument including the acceptability of its reasons, assumptions, and evidence; develop and defend a position on an issue; ask appropriate

clarifying questions; plan experiments and judge experimental designs; define terms in a way appropriate for the context; be open-minded; try to be well informed; and draw conclusions when warranted, but with caution.

Similarly, Pascarella and Terenzini (2005), based on the work of Jones (1995) and Erwin (2000), indicate that critical thinking typically involves the ability of individuals to, "identify central issues and assumptions in an argument, recognize important relationships, make correct inferences from data, deduce conclusions from information or data provided, interpret whether conclusions are warranted on the basis of the data given, evaluate evidence or authority, make self corrections, and solve problems" (p.156). In addition, through a meta-analysis of the literature concerning critical thinking Pascarella and Terenzini (2005) add that critical thinking involves both cognitive skills and the disposition to use those skills.

Paul (1993) defines critical thinking as "disciplined, self directed thinking which exemplifies the perfections of thinking appropriate to a particular mode or domain of thinking" (p. 462). Likewise, Siegel (1988) defines a critical thinker as "one who is appropriately moved by reasons: she has a propensity and disposition to believe and act in accordance with reasons; she has the ability to assess the force of reasons in the many contexts in which reasons play a role" (p. 23). In addition, Watson and Glaser (1980) indicate that critical thinking involves five skills: inference, recognition of assumptions, deduction, interpretation, and evaluation.

Facione's (1990) definition of critical thinking incorporates many of the aspects of each of the definitions of critical thinking previously mentioned. That is not surprising since it was developed by a panel of critical thinking experts, including two of the

theorist, Ennis and Paul, whose definitions are above. The panel of experts, led by Facione, (1990) define critical thinking as, "purposeful, self-regulatory judgment which in interpretation, analysis, evaluation, and inference, as well as, explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based (p.2)." In addition, two dimensions of critical thinking are identified: cognitive skills and affective dispositions (Facione, 1990). Critical thinking cognitive skills are those skills that one employs while engaging in critical thinking such as interpretation, analysis, evaluation, inference, explanation and self-regulation (Facione, 1990). Critical thinking disposition concerns the likelihood of individuals to engage in critical thinking and to encourage others to engage in critical thinking (Facione, 1990). Individuals disposed to critically think exhibit the following characteristics: inquisitiveness, concern about being informed, alertness, belief in the process of reasoned inquiry, self-confidence, open-mindedness, flexibility, understanding others' opinions, being fair-minded, self-awareness, making appropriate judgments, willingness to reconsider decisions, orderliness, diligence, persistence, and precision (Facione, 1990).

Building off the work of Facione (1990), Jones et al. (1995) expands this definition of critical thinking by identifying additional critical thinking skills and disposition characteristics. Like Facione (1990), the study conducted by Jones et al. (1995) used the Delphi method as the vehicle for 600 faculty, employers and policy makers to identify the important critical thinking characteristics that all college graduates should possess. The participants in this study confirm that the critical thinking skills and dispositional characteristics proposed by Facione (1990) were important (Jones et al., 1990). However, faculty, employers and policy makers disagree about the relative

importance of aspects of some of the critical thinking skills identified (Jones et al., 1995). For example, faculty believe that being able to detect strong emotional language, and being able to assess bias, narrowness and contradictions in arguments, both sub-characteristics of interpretation, are more important aspects of critical thinking than both employers and policy makers believed (Jones et al., 1995).

Similarly to Facione (1990) and Jones et al. (1995), Paul and Nosich (1991) define critical thinking as, " the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication , as a guide to belief and action (p. 4)." In addition, Paul and Nosich (1991) identify what they describe as four component domains of critical thinking. These domains are: the elements of thought, macro abilities, affective dimensions and intellectual standards. Elements of thought are essential and universal elements of reasoning such as having an end in mind, identifying a question to be answered, making reasonable assumptions and identifying consequences (Paul & Nosich, 1991). Macro-abilities involve the combining of the elements of thoughts to address more complex issues (Paul & Nosich, 1991). Examples of macro-abilities include refining generalizations and avoiding over-simplifications, evaluating the credibility of sources, and generating or assessing solutions (Paul & Nosich, 1991). Affective dimensions refer to attitudes, dispositions and interests that lead individuals to utilize their critical thinking skills (Paul & Nosich, 1991). Finally, intellectual standards refer to the criteria by which individuals' critical thinking in a particular situation should be evaluated.

Facione (1990), Jones et al. (1995) and Paul and Nosich (1991) may organize their definitions of critical thinking differently, but the basic elements of their definitions are in agreement. According to all three of their definitions critical thinking occurs when an individual engages in a process, due to some level of disposition to do so, of interpretation, analysis, evaluation, inference, explanation and self-regulation with the purpose of answering or furthering their understanding of a question. Given the consensus among these definitions of critical thinking, the following definition of critical thinking, based on the definitions proposed by Facione (1990), Jones et al. (1995) and Paul and Nosich (1991), is used in this study: critical thinking is the process of making purposeful, self-regulatory judgments through interpretation, analysis, evaluation, inference, and explanation motivated by the disposition to habitually engage in these behaviors.

Non-L/L Program Influences on Critical Thinking

Students' background, college entry characteristics and different experiences during college affect the extent to which an individual student's ability to critically think develops (Astin, 1993; Pascarella & Terenzini, 2005). L/L program environments have the potential to serve as a vehicle through which students are exposed to a number of the experiences associated with gains in critical thinking ability. As a result, it is important to identify those factors that influence critical thinking ability to help draw conclusions about the origin of L/L programs' differential effects on participants' critical thinking ability.

Unfortunately the assessment of critical thinking is complex and difficult and the methods used are quite varied. Some studies have employed the use of self-reported

levels of critical thinking, and some have used qualitative analyses to examine the impact of certain experiences, while others use standardized measures of critical thinking. For example, Tsui (1999), while studying how courses and instruction affect critical thinking ability, assesses critical thinking ability through students responding to survey questions about their growth in critical thinking ability since entering college. However, in another study on how faculty attitudes are related to the development of students' critical thinking ability, the same researcher uses a case study analysis and conducts interviews with faculty and students to assess critical thinking ability (Tsui, 2001). Finally, Flowers and Pascarella (2003) assess differences in the critical thinking ability of Caucasian and African American participants using the College Assessment of Academic Proficiency critical thinking module.

Further complicating the interpretation of results from these studies is that there are so many different and varied definitions of critical thinking (Pascarella & Terenzini, 2005; Tsui, 1998). Many definitions have a common thread of including cognitive and affective components, but the large number of complex cognitive components such as reasoned inquiry, self-confidence, open-mindedness, flexibility, understanding others' opinions, being fair-minded, self-awareness, making appropriate judgments, willingness to reconsider decisions, orderliness, diligence, persistence, and precision make it difficult to measure and even more difficult to compare across studies (Facione, 1990).

Background characteristics.

There is mixed evidence concerning the effect of age on the development of critical thinking ability. Whitmire (1996) finds that older students are less likely to report gains in critical thinking ability while, Arnold, Kuh, Vesper and Schuh (1993) find no

effect of age. The literature shows that Gender may have a role, with males reporting greater gains in critical thinking ability during college than females (Li, Long & Simpson, 1999). The participants in this study are 694 (58.5% female and 41.5% male) college students who had completed at least 90 credits. This study assesses self-perceived gains in critical thinking and communication skills associated with disciplinary differences. Gender is included in the analysis as an input characteristic, and the structural equation analyses revealed that the self-reported critical thinking skills scores of females in this study are .08 of a standard deviation less than males participating in the study.

It is important to note that several studies find that males tend to have greater confidence in their cognitive skills than females (Furnham & Fong, 2000; Pallier, 2003; Petrides & Furnham, 2000; Rammstedt & Rammsayer, 2000). As a result, men tend to rate their performance on cognitive tasks higher than women (Pallier, 2003). Since the measure of critical thinking in the study by Li, Long and Simpson (1999) is self reported, it is possible that the differences found are related more to differences in participants' confidence in their critical thinking ability rather than differences in their actual abilities.

Also, studies show that race can play a role in the development of critical thinking ability with Caucasian students demonstrating greater gains during college than African American students (Gadzella, Masten & Huang, 1999; Flowers & Pascarella, 2003). Gadzella, Masten and Huang (1999) examine differences in critical thinking measured by the Watson-Glaser Critical Thinking Appraisal, between 51 African American and 52 Caucasian students. On average the Caucasian students in this study score higher on the critical thinking measure than African American students on average ($F=12.61$, $p<.001$).

Flowers and Pascarella (2003) collected data from 18 4-year colleges and universities from 1,054 students who participated in the initial data collection in the spring of 1993, the first follow up in the Fall of 1994 and the third and final follow up in the spring of 1995. Students completed the Collegiate Assessment of Academic Proficiency (CAAP) critical thinking module at all three administrations and in the Fall 1992 pre-college administration of the CAAP critical thinking module. The results show that in the first and third year Caucasian students score significantly higher than African American students on critical thinking when pre-college characteristics, institutional characteristics, academic experiences and social experiences are taken into account (Flowers & Pascarella, 2003).

Campus involvement.

Specific types of student involvement on campus also contributes to the development of critical thinking ability. Students, who work while in college, participate in clubs and organizations and live on campus show greater gains in critical thinking than students who do not take part in these experiences (Gellin, 2003). In addition, participation in athletics and greek organizations has a negative effect on development of critical thinking ability (Pascarella, Whitt, Nora, Edison, Hagedon, & Terenzini, 1996).

Institutional type.

An examination of the literature concerning the effect of institutional type on the development of critical thinking ability shows that there are no significant differences in critical thinking gains between students at two and four year institutions (Pascarella, Whit, Nora, Edison, Hagedon, Terenzini, 1996). In addition, though differences have been found between the development of critical thinking between Caucasian and African

American students, there are no differences between African American students attending predominately white institutions and those attending historically black colleges and universities (Flowers & Pascarella; 1999; Pascarella, Whit, Nora, Edison, Hagedon, & Terenzini, 1996; Terenzini, Yeager, Bohr, Pascarella, & Whitt, 1997; Whitt, Edison, Pascarella, Nora, & Terenzini, 1999). Interestingly, students attending research intensive, comprehensive and liberal arts institutions show fewer gains in critical thinking ability than students attending associates of arts institutions (Whitmire, 1996).

Enrollment status.

The evidence of the effect of enrollment status on the development of critical thinking ability is mixed. A study using the responses of 2,685 first year students from the National Study of Student Learning (NSSL) by Pascarella, Bohr, Nora and Terenzini (1996) finds that full time students showed greater gains in critical thinking than part time students. On the other hand, Arnold, Kuh, Vesper and Schuh (1993) using data from the responses of approximately 3,048 students between the ages of 18 and 28 from the College Student Experiences Questionnaire (CSEQ), shows that enrollment status has no effect on the development of intellectual skills, which include key aspects of critical thinking skills such as self learning, and gathering and pursuing information. However, the interaction of enrollment status and peer relationships is significant. Specifically, part-time students who have positive relationships with peers, faculty and staff show greater gains than part-time students who do not perceive positive relationships.

Classroom experiences.

Critical thinking skills are also affected by classroom experiences (Cabrera, Colbeck & Terenzini, 2001). Students who have faculty who are confident that students

can critically think, are exuberant about teaching, and are creative and willing to experiment, show greater gains in critical thinking ability (Tsui, 2001). Students also show greater gains in critical thinking ability if active and collaborative learning techniques are used in the classroom (Cabrera, Colbeck & Terenzini, 2001; Tsui, 2001). Interestingly, Minority students have been found to be more predisposed to collaborative learning than are White students (Cabrera, Nora, Crissman, Terenzini, Bernal, & Pascarella; 2002). However, regardless of differences in predisposition all students show significant gains in analytical skills when taught in a collaborative learning environment (Cabrera, Nora, Crissman, Terenzini, Bernal, & Pascarella; 2002). Students' ability to think critically is also enhanced when faculty engage in certain teaching practices and other faculty/student interactions (Cabrera, Colbeck & Terenzini, 2001; Cruce, Wolniak, Seifert & Pascarella, 2006). These practices include: encouraging faculty/student contact, cooperation, active learning, prompt feedback, emphasizing time on task, having high expectations, and respecting different talents and learning styles.

Also, Umbach (2006) finds race/ethnicity and gender differences among faculty members concerning their emphasis of higher order cognitive experiences including aspects of critical thinking such as analysis, making judgments, explanation and evaluation. Umbach (2006) also finds that faculty of color, except for Native Americans, emphasize higher order cognitive experiences more than White faculty. In addition, female faculty members emphasize higher order thinking more than their male counterparts (Umbach, 2006).

In addition, different course and instructional methods may affect the development of critical thinking ability (Li, Long & Simpson, 1999; Pithers & Solden,

2000; Tsui, 1999). Students participating in writing courses, interdisciplinary courses, honors programs, history courses, women's studies courses, and science and math courses show gains in critical thinking ability (Tsui, 1999). Interestingly, research concerning the effect of instructional practices on cognitive abilities shows that pre-college academic motivation, number of hours worked, hours spent studying and the cognitive level of instruction in the classroom contributes to the development of critical thinking ability while type of course does not (Doyle, Edison & Pascarella, 2000). Similarly, other studies have shown that academic integration in the classroom and the high quality lower division courses are associated with gains in students' ability to think critically (Li, Long & Simpson, 1999).

In a review of the literature on critical thinking, Pithers and Solden (2000) find general agreement that students must teach themselves to be reflective in order to develop critical thinking skills. However, teachers are important facilitators of this process (Pithers & Solden, 2000). While teacher behavior can be beneficial to this process, certain teacher behaviors can also been linked to inhibiting the development of critical thinking among students (Pithers & Solden, 2000; Raths, Wasserman, Jonas & Rothstein, 1966; Sternberg, 1987). Teachers' behaviors that inhibit the development of critical thinking among students are: agreeing or disagreeing without discussion or explanation, cutting off students' responses, focusing only on the retrieval of knowledge and memorization, and hindering students' belief in the value of exploring new ideas (Raths et al., 1966). In addition, teachers who believe they have nothing to learn from students, that they must think for their students, that there is one correct process for facilitating the learning of critical thinking for all students, and that the correct answer is more important

than the process of arriving at that answer create environments in which students ability to develop critical thinking skills will be stifled (Sternberg, 1987).

Though teachers' facilitation of the process of developing students' critical thinking ability can be detrimental, it can also be an important contributor to gains in critical thinking ability (Pithers & Solden, 2000). Teachers who teach from multiple perspectives, demonstrate relationships and common themes among content, encourage active learning in the form of questioning and information seeking, challenge students currently held ideas, and encourage students to purposefully reflect on and analyze core beliefs and assumptions will help to enhance critical thinking skills (Langer, 1997; Raths et al., 1966).

The process of "scaffolding" includes each of these concepts in an attempt to assist students in the process of finding answers to questions or solve problems (Bliss, Askew & Macrae, 1996; Woods & Woods, 1996). Through scaffolding, teachers keep students interested, limit opportunity for frustration, point out aspects of the issue that the student may have missed, demonstrate how to reach the desired result and keep the student on task (Bliss, Askew & Macrae, 1996; Woods & Woods, 1996). As a result, students are able to bridge the gap between the ability to solve problems on their own and their ability to solve problems with assistance, a concept known as the zone of proximal development (Rogoff & Wertsch, 1984; Vygotsky, 1978). Teachers who employ scaffolding in their teaching practices help students to develop their critical thinking skills through the process of figuring out content related problems regardless of what the content may be (Pithers & Solden, 2000).

Academic major.

The research concerning the effect of college major on critical thinking is mixed. Majoring in education and fine arts is shown to have negative effects on critical thinking while majoring in science and physical sciences has positive effects (Astin, 1993). Also, psychology and special education majors have significantly higher critical thinking test scores that sociology, social work and criminal justice majors (Gadzella & Masten, 1998). In addition, research shows that art majors score significantly higher than non-arts majors in three aspects of critical thinking disposition: truth seeking, critical thinking maturity and open mindedness (Lampert, 2007). Finally, health education majors have significantly higher critical thinking disposition test scores than health education minors (Broadbear, Jin & Bierma, 2005). However, a number of other studies examining major field differences in critical thinking ability find no significant differences (Li, Long & Simpson, 1998, 1999; McDonough, 1997; Money, 1997; Terenzini, Springer, Pascarella & Nora, 1995). It is possible that the differences in critical thinking ability found in some studies may be due to students seeking out majors that reinforce or reward critical thinking and are not the result of the experience itself (Li, Long and Simpson, 1999; Tsui, 1999).

This notion is somewhat consistent with Holland's (1997) "theory of careers" which was originally created to explain vocational choice but has also been applied to college major choice as well. This person-environment fit model is based on three assumptions: 1) people choose environments that are compatible with their personalities, 2) different environments reinforce different patterns of skills and abilities, and 3) people achieve the highest levels of success in environments that match their dominant

personality types. The six environments included in Holland's (1997) theory are: realistic, investigative, artistic, social, enterprising and conventional.

According to this theory, student will select majors that are consistent with their personalities, so it is possible that students who are predisposed to engage in and to be good at critical thinking will chose majors that allow them to engage in critical thinking. However, this theory also holds that because students with different majors are exposed to different academic environments, they will develop different skill sets that are in line with the environment to which they belong. For example, since investigative environments emphasize analysis and problem solving, two hallmark characteristics of critical thinking, more so than artistic environments, students majoring in investigative fields such as math, biology, chemistry, physics, chemical engineering, and sociology may have more developed critical thinking skills than students with artistic majors so long as their personality type is congruent with the environment.

Interestingly, studies show that while students whose personality types are congruent with their environments demonstrate gains in their dominant abilities and skills, students whose personality types are incongruent with their environments show losses in their dominant skills and abilities (Feldman, Smart & Ethington, 1999, 2001, 2004). However, students with personality types that are incongruent with their environments still show gains in the skills and abilities associated with that environment that were approximately the same as students who are congruent with their environment (Feldman, Smart & Ethington, 2001, 2004).

The structure of course content also varies between majors (Smart & Umbach, 2007). When faculty members belonging to investigative, artistic, social or enterprising

environments are asked to rate the extent to which they structure their courses to foster student learning in twelve different areas, the results show that faculty members of different environments tended to emphasize different areas of student learning (Smart & Umbach, 2007). It is interesting to note that in this study the results do not show that thinking critically or analytically was any more or less emphasized by faculty in any of the different academic environments (Smart & Umbach, 2007). Differently, Umbach (2006) found that faculty in investigative and conventional disciplines are least likely to emphasize higher order thinking activities such as the analysis, judgment, evaluation and explanation, aspects of critical thinking, while realistic faculty are most likely to emphasize them. However, all of these results support the idea that students who are skilled and interested in critical thinking will choose majors that enhance those skills and as a result will demonstrate higher levels of critical thinking ability.

Similarly, it is possible that students who chose to participate in RH and CSL programs do so because the environments these programs provide are consistent with their personalities and reinforce their skill they already possess to some degree such as critical thinking skills. In addition to self-selection, RH program participants are often recruited by faculty and administrators who are purposely trying to recruit students who will be successful in this environment, and already exhibit the skills that will help them to be successful (Inkelas & Weisman, 2003). Applying the tenets of the person-environment fit model, it is possible that students who chose to join RH and CSL programs, where opportunities to engage in critical thinking exist, are already skilled to some degree in critical thinking and predisposed to improvement. As a result, differences the relationship between critical thinking and L/L program participation found may be

due to the personality of participants in addition to the experiences these programs provide.

Perceived academic control.

Perceived academic control is the extent to which individuals believe that they can affect their academic achievement (Perry, 2003; Perry, Hladkyj, Pekrun & Pelletier, 2001; Perry, Hladkyj, Pekrun, Clifton & Chipperfield, 2005). Stupnisky, Renauld, Daniels, Haynes and Perry (2008) hypothesize that students with higher levels of perceived academic control might be more disposed to engage in critical thinking because they believe that their efforts will yield positive results. In addition, students with lower perceptions of academic control would be less likely to engage in critical thinking because they believe their efforts would be less likely to produce a desired result (Stupnisky et al., 2008). The results of their study show a reciprocal relationship between critical thinking disposition and perceived academic control. Students who are disposed to critically think perceived higher levels of academic control, and students with higher perceived academic control are more disposed to engage in critical thinking (Stupnisky et al., 2008).

Interpersonal interaction.

Students' interactions with faculty and peers have been shown to influence their development of cognitive complexity and critical thinking skills (Cruce, Wolniak, Seifert & Pascarella, 2006; Kuh, 1995). High quality interaction between students' interactions with faculty and peers outside of the classroom contribute to greater development of critical thinking skills (Cruce et al., 2006). Also, faculty contact outside the classroom contributes to gains in cognitive complexity (Kuh, 1995). In addition, gains in cognitive

complexity are attributed by students to interaction with peers, academic activities, ethos, and leadership responsibilities (Kuh, 1995).

Peer interaction also contributes to gains in critical thinking ability at the end of the first year (Whitt, Edison, Pascarella, Nora & Terenzini, 1999). However, research has shown that there is no effect of peer interaction on the development of critical thinking ability during the second or third year of college (Whitt, Edison, Pascarella, Nora & Terenzini, 1999). In addition, once student entry level and institutional characteristics are taken into account, only peer interactions that are non-course related contribute to the critical thinking abilities of first year students (Whitt, Edison, Pascarella, Nora & Terenzini, 1999).

Residence hall experience.

One environment with great potential for peer, student/faculty and student/administrator interaction is the college residence hall (Schroeder, 1994). Residential environments in general have a positive, but small effect on student outcomes (Terenzini, Pascarella & Blimling, 1996). Though there are many studies examining the educational benefits of living in campus residences, studies examining the effect of living in residence halls on the development of critical thinking ability are limited (Schroeder, 1994; Pascarella & Terenzini, 2005). Research has shown that first-year students living in residence show greater gains in critical thinking ability than first-year commuter students (Pascarella, Bohr, Nora, Zusman, Inman & Desler, 1993). However, other studies have shown that living in residence halls alone does not account for gains in critical thinking skills (Pascarella, 1999). However, when Pascarella (1999) included living in a campus residence in a composite with other types of involvement behavior the

composite measure explained a small but significant amount of first-year students' gains in critical thinking skills during their first year. In addition, a study by Inman and Pascarella (1998) shows that there are no differences between resident and commuter students in the development of first-year students' gains in critical thinking ability when pre-college skills and demographic characteristics were taken into account.

Interestingly, in a study using data from the CSEQ concerning the effect of living in residence halls on gains in intellectual skills, Pike (1999) also finds no direct effects of living on campus. However, living in residence halls is shown to have an indirect effect on gains in intellectual skills associated with greater interaction between residents. While residence halls in general can provide a venue for positive peer interaction, L/L programs within the residence halls can improve the nature and frequency of peer and faculty interaction which could bolster the indirect effect of living in college residence halls on educational outcomes (Pike, Schroeder& Berry, 1997).

Living-Learning Programs

Living-learning programs are a common fixture in college and university residential halls (Heiss, Cabrera & Brower, 2008; Gabelnick, MacGregor, Matthews & Smith, 1990). Their common presence on college and university campuses is due in part to their ability to involve students in the college experience and the research showing that involved students have a more successful college experience (Astin, 1993; Kuh, Schuh, Whitt & Associates, 1991; Kuh, Kinzie, Schuh, Whitt & Associates, 2005). Astin (1993) found that the more students are involved in their college experience, meaning the greater the amount of time spent and the greater the intensity of their exposure, the higher their

satisfaction with their college experience, self reported growth in cultural awareness, leadership skills, interpersonal skills and job skills.

However, the type of engagement and timing of engagement appears to be important as well (Gordon, Ludlum & Hoey, 2008). For first-year students, time spent on academic activities, time spent relaxing, time spent engaging in co-curricular activities and working at least 21 hours off campus are positively associated with GPA (Gordon, Ludlum & Hoey, 2008; Kuh, Cruce, Shoup, Kinzie & Gonyea, 2008). In addition, participation in internships or co-ops, the quality of relationships with peers, time spent engaging in co-curricular activities and engaging in educationally purposeful activities are positively associated with first-year student retention (Gordon, Ludlum & Hoey, 2008; Kuh, Cruce, Shoup, Kinzie & Gonyea, 2008). However, quality of relationship with faculty and discussing academic topics with faculty outside of class are negatively related to GPA (Gordon, Ludlum & Hoey, 2008). Differently, seniors who work on research projects with faculty and ask questions in class have higher GPAs, but discussing academic topics with faculty members and time spent on academic activities are unrelated to senior GPA (Gordon, Ludlum & Hoey, 2008). However, the more students are engaged in their college experience, the greater their gains in student outcomes such as critical thinking skills (Carini, Kuh & Klein, 2006; Kuh et al., 1991). In particular, both Carini et al. (2006) and Kuh et al. (1991) find that increased involvement in residential environments contributes to college student success.

Living-Learning Program Types

Living-learning (L/L) programs have taken on many forms across institutions (Inkelas & Weisman, 2003). Inkelas and Weisman (2003) identify three different types

of L/L programs: Transition Programs, Academic Honors Programs, and Curriculum Based Programs. Each of these programs has a different focus and produces a different set of outcomes. In addition, Inkelas et al. (2004) identified a living and learning typology based on the data from the National Study of Living-Learning Programs. The typology includes the following types of programs: Civic/Social Leadership Programs, Cultural Programs, Disciplinary Programs, Fine & Creative Arts Programs, General Academic Programs, Residential Honors Programs, Outdoor Recreation Programs, Research Programs, Residential Colleges, Transition Programs, Upper Division Programs, Wellness/Healthy Living Programs and Women's Programs. These programs differ in several ways including the presence of an academic focus, a co-curricular focus, collaboration with faculty, credit for participation, and participants' age.

Each of these types of programs was created with the intention of facilitating the greater involvement and engagement of students in the residence halls; however, they take many different approaches to achieve this goal. In addition, since most research on L/L programs has been conducted within individual institutions, comparisons of the outcomes of different types of L/L programs has been difficult and rarely conducted (Inkelas, Johnson, Lee, Daver, Longerbeam, Vogt & Leonard, 2006).

Living-Learning Program Outcomes

There is some evidence to suggest that participation in L/L programs can have positive impacts on student outcomes in college (Terenzini, Pascarella & Blimling, 1996). Students who participate in residential Freshman Interest Groups (FIG) have higher academic integration scores and persistence rates than non-Fig group members (Pike, Schroeder & Berry, 1997). In addition, participation in L/L programs does not

affect academic success, but is associated with an increased likelihood that students will persist (Edwards & McKelfresh, 2002). Also, students who participate in L/L programs have higher levels of involvement, interaction, integration and gains in student learning and intellectual skills than students in traditional residence hall settings during their first year (Pike, 1999). However, gains in intellectual development have been shown to be due to an indirect effect associated with peer interaction (Pike, 1999). Arms, Cabrera, and Brower (2008) find that L/L program students with academic advising integrated into their living environments report higher levels of engagement with enriching learning experiences than non-L/L program participants who also had academic advising available in their living environment. These findings support the possibility that some of the benefit of L/L program participation is due to the opportunities for interpersonal interaction they foster.

Research has shown that there is no difference in the self perceptions of growth in cognitive complexity, which includes students' ability to critically analyze, among first year students participating in L/L programs or just live in the residence halls but do not participate in an L/L program (Inkelas, Johnson, Lee, Daver, Longerbeam, Vogt & Leonard, 2006). However, perception of peer environment does appear to influence perception of cognitive growth evidencing that peer interaction is an important aspect of the L/L program experience. In addition, the results of a study conducted by Inkelas, Vogt, Longerbeam, Owen and Johanson (2006) show that L/L program participants are more confident in their critical thinking skills, academic skills, application of knowledge and abilities and growth in liberal learning than their peers who live in the residence halls but do not participate in an L/L program.

Inconsistencies in findings concerning the outcomes of participating in L/L programs may result from their different structures and formats. Inkelas and Weisman (2003) compare outcome measures associated with participation in three different living and learning programs: Transition Programs, Academic Honors Programs and Curriculum-Based Programs. They find that students who participate in Transition and Academic Honors programs use critical thinking skills, meet socially with faculty, and discuss socio-cultural issues more often than students in curriculum based programs (Inkelas & Weisman, 2003).

Most important to the current study, two previous studies found that participation in Residential Honors or Civic/Social Leadership programs enhanced critical thinking ability. Seifert, Pascarella, Colangelo and Assouline (2007) found that students participating in honors programs showed greater gains in critical thinking ability than non-honors students. However, the results of this study can not be attributed to the residential aspect of honors programs because it is not known how many of the honors programs included in the study have a residential component. These findings are important though because it shows that honors programs, of which Residential Honors programs are a subset, influence the critical thinking of participants. In addition, Inkelas et al. (2004) find that participants in Civic/Social Leadership Programs and Residential Honors Programs have higher critical thinking utilizations scores than participants in other types of L/L programs.

The result of all of these studies need to be carefully considered due to possible significant variation in the entry characteristics of students who either self-select or are recruited and selected to join each program. For example, of the 9 RH programs included

in this study 9 rate their programs as selective, 7 have standardized test score requirements, 7 have minimum high school GPA requirements, and 3 require a high school recommendation. Conversely, only 2 of the CSL programs involved in this study rate their programs as selective and none have standardized test or high school GPA requirements, nor do any require high school recommendations. As a result, it is quite possible that RH programs recruit higher achieving students than CSL programs because they are required to recruit high achieving students while CSL programs are not. Therefore it is important to carefully examine the association of critical thinking with each program to assess whether any differences in the self-perceived critical thinking of participants in the L/L programs in this study are due to the L/L program experience and not the pre-college characteristics of participants.

Summary

The literature cited here shows that exposure to the college environment can help students to develop critical thinking abilities through a variety of experiences. In addition, the literature shows that development of these skills is enhanced by experiences in and outside of the classroom. Living-learning programs were created to harness these benefits and provide a smaller environment in which students can become more involved, interact with peers, faculty and administration, and blur the lines between their in classroom and out of classroom experience (Boyer, 1998; Pascarella & Terenzini, 2005; Kuh et al., 1991). However, the literature concerning the benefits of L/L program participation is mixed (Pascarella & Terenzini, 2005). This fact is not surprising given the wide variety of L/L program structures and formats that currently exist in higher education. The varied findings concerning student outcomes becomes even less

surprising considering that some L/L programs do not include important factors such as faculty and peer interaction. In addition, the studies examining the benefits of L/L program participation use a variety of statistical measures, some of which do not account for entry characteristics and other variables that may confound the findings. Finally, many of these studies examine data from single institutions, and as a result, the findings may have more to do with institutional factors rather than participation in the type of L/L program being examined (Inkelas et al., 2004; Pascarella & Terenzini, 2005).

Chapter III:

Methodology

This chapter describes the research design followed in examining the association of students' self-perceived critical thinking ability with participation or non-participation in L/L programs. A detailed discussion of the purpose of the study, the research question and hypothesis, the conceptual model, the research design, and the data analysis are provided.

Purpose of the Study

The purpose of this study is to explore the relationship between self-perceived critical thinking ability and participation in Residential Honors (RH) living-learning (L/L) programs versus self-perceived critical thinking ability and participation in CSL L/L programs and also versus non-participation in L/L programs. The research question guiding this study is: What is the relationship between different types of inputs and environments and self-perceived critical thinking for students in Residential Honors (RH) L/L programs, Civic/Social Leadership (CSL) L/L programs and students not participating in any L/L programs (NPLL)? The literature suggests that experiences during students' college careers differentially affect their development of critical thinking ability (Pascarella & Terenzini, 2005). Participation in L/L programs has been shown to contribute to critical thinking ability, and various L/L programs have been shown to differ in the magnitude of their contribution to the development of critical thinking ability (Inkelas & Weisman, 2003; Inkelas, Johnson et al., 2006; Inkelas, Vogt et al., 2006; Seifert et al., 2007). Based on the literature, the following hypothesis is proposed.

Hypothesis

The relationship between participation in RH programs and self-perceived critical thinking will be greater that the relationship between self-perceived critical thinking and participation in CSL programs and non-participation in any L/L Program. Though research is limited on the effect of L/L program participation on development of critical thinking skills, the available literature does show that students who participate in RH programs use critical thinking skills and show greater gains in critical thinking ability than non-RH living-learning program students and NPLL students (Inkelas &Weisman, 2003; Inkelas et al., 2004; Pascarella & Terenzini, 2005; Seifert et al., 2007).

The various types of L/L programs provide different experiences for their participants due to their different thematic focuses and levels of interaction with faculty, staff and peers, and the presence or lack of a classroom curricular component (Inkelas et al., 2004). Inkelas and associates (2004) established a typology of 13 different types of L/L programs based on the results of the 2004 administration of the National Study of Living-Learning Programs. The topics of the programs were: Civic/Social Leadership, Cultural, Disciplinary, Fine and Creative Arts, General Academic, Residential Honors, Outdoor Recreation, Research, Residential Colleges, Transition, Upper Division, Wellness/Healthy Living, and Women's Issues.

Since classroom experiences and faculty, staff and peer interaction are shown through the literature to aid in the development of critical thinking skills, hypotheses can be proposed as to which L/L programs show the greatest gains in critical thinking ability (Bliss, Askew & Macrae, 1996; Cabrera, Colbeck & Terenzini, 2001; Colbeck, Cabrera & Terenzini, 2001; Cruce, Wolniak, Seifert & Pascarella, 2006; Kuh, 1995; Li, Long &

Simpson, 1999; Pithers & Solden, 2000; Tsui, 1999, 2001). Two of the most important influences on the development of critical thinking ability are faculty and peer interaction both in and out of the classroom (Tsui, 1999; Pike 1999).

According to Inkelas and her associates' (2004) definitions of RH and CSL programs, and based on the program level data from the 2004 NSLLP, RH programs more often have a curricular component and faculty involvement than CSL programs. In addition, RH programs more often provide a structured curriculum of experiences than CSL programs (Inkelas et al., 2004). Finally, RH and CSL programs generally provide a more structured experience and greater opportunities for interaction with faculty and peers than the experience of living in the residence halls, but not participating in any L/L program (Inkelas et al., 2004, Pike 1999). Given the greater amount of faculty interaction and the presence of a structured residential curriculum in RH programs, it is hypothesized that students who participate in RH programs show greater levels of self-perceived critical thinking ability than CSL program participants and students who did not participate in any L/L program.

Conceptual Model

The conceptual model employed in this study is Astin's (1993) Inputs-Environment-Outcomes model. Inputs are student characteristics at the time of entry into an institution of higher education. Environments include the influences students are exposed to while in college including faculty and peer interactions, course work, institutional policies, racial/ethnic climate, and many others. Outcomes are described as student characteristics that have changed once they have been influenced by different aspects of the college environment (Astin, 1993).

Astin asserts that this model helps faculty, administrators, students and policy makers to gain a better understanding of the actual impact of college environmental factors on students. Without taking student inputs into account, any causal conclusions drawn about the impact of college experiences on student outcomes can be questioned because differences may be due to student characteristics prior to initial entry into the institution (Astin, 1993). As a result, inputs and other environmental characteristics that may influence the student outcome being examined are taken into account in order to substantiate the findings.

Research Design

This exploratory quantitative study employs a casual comparative design. This design is appropriate for studies in which the participants belong to pre-existing groups and the independent variable is not manipulated due to ethical or other reasons that prevent manipulation (Mertens, 2005). While an experimental design that involves randomly assigning participants to groups and experimental manipulation of independent variables would give greater confidence in a causal relationship between L/L program participation and critical thinking ability, such methods would significantly interfer with the college experiences of the survey participants. In addition, since the data being used for this study are from a pre-existing data set, no current manipulation of group membership or control over variables is possible.

Instrumentation and Data Collection

The data utilized for this study were collected through the National Study of Living-Learning Programs (NSLLP) conducted by Inkelas et al. (2004) (see Appendix

A). The purpose of the study was to examine the impact of participation in L/L programs on a variety of student outcomes (Inkelas et al., 2004).

NSLLP Sample

The data were collected at a total of 34 institutions of higher education, 27 Research Extensive institutions, 1 Research Intensive institution and 7 Masters Colleges and Universities. The sample included 12,236 students who participated in L/L programs and 11,673 students that did not participate in living and learning programs.

The participants were approximately 35% male and 65% female. In addition, 4.7% of the sample was African American, 11.7% was Asian Pacific American, 0.3% was American Indian, 3.1% was Hispanic/Latino, 75.6% was Caucasian, and 3.5% was multi-racial or multi-ethnic. Participants whose total family income was $50,000 or higher composed 75.1% of the sample, and the percentage of parents highest level of education who at least attained a Bachelors degree was 62.2% for fathers and 66.2% for mothers. The sample of L/L program participants consisted of either the entire population of L/L program students from each institution, or a randomly selected sub sample. The comparison sample of students who did not participate in any L/L programs were matched to the L/L program sample, stratified by race/ethnicity, gender, academic class level and residence hall occupancy (Inkelas et al., 2004).

NSLLP Survey

The NSLLP questionnaire included two sections (Inkelas et al., 2004). The first section included 60 questions developed by NSLLP staff to gather information concerning background and demographic information, the college experience, and campus life. The second section consisted of ten custom questions designed by the

institutions. Scales were created by Inkelas et al. (2004) representing the major constructs of the study: inputs, environments, and outcomes. The Cronbach alpha scores for the scales ranged from .624 to .918 for the 2004 NSLLP data (Inkelas et al., 2004).

Data Collection

The data were collected by Inkelas and associates through MSIResearch (Inkelas et al., 2004). Each campus involved in the study obtained Internal Review Board approval before the assessment began. The survey was available on line beginning no earlier than January 26, 2004 and no later than March 19, 2004. Students were contacted electronically to solicit their participation, and were given a unique ID required to log into the survey. In addition, some schools made additional contacts, and offered incentives for participation. The overall response rate was 33.3% (Inkelas et al., 2004).

Data concerning program and institutional information were collected through an administrator survey completed by the individual school's project leader. The survey gathered descriptive information about the institution and the living-learning programs housed at that institution (Inkelas et al., 2004).

Data from the National Study of Living-Learning Programs were used with the permission of Dr. Karen Kurotsuchi Inkelas, principal investigator of the NSLLP. Access to the data was granted upon acceptance of the dissertation proposal and receipt of the University of Maryland's Institutional Review Board approval. The Institutional Review Board approval for this study is included in Appendix B.

Current Study Sample

The participants in this study are 637 first-year college students from eight Research Extensive Universities who have both RH and CSL programs and participated

in the National Study of Living-Learning Programs administered during the winter of 2004. The sample consists of 304 (48%) RH program students, 122 (19%) CSL program students, and 211 (33%) first-year students who did not participate in any L/L program, but lived in the residence halls (NPLL). The students in the NPLL group were selected at random from among the first-year students who did not participate in an L/L program at one of the eight institutions represented in the sample.

Chickering and Reisser (1993) and Baxter Magolda (1992) propose models of student development throughout college that include the development of critical thinking skills and abilities. They indicate that development occurs over time due in part to exposure to the college and university environment, the development of critical thinking ability and skills will continue throughout the college years, and development of cognitive and intellectual skills such as critical thinking skills can begin in the first-year student (Chickering & Reisser, 1993).

As stated in the literature review, Chickering and Reisser (1993) theorize that student development occurs along 7 different vectors. Though Chickering and Reisser's (1993) model allows for individuals who have already moved along a vector earlier in their college career to revisit it, it specifies that most students will focus on the development of critical thinking skills along the Developing Competence vector, the first of the seven vectors, early in their college careers to serve as a foundation for future development. In addition, while Baxter Magolda (1992) find that most first-year students are Absolute Knowers and not developmentally ready to think critically, about a third are Transitional Knowers, a stage in which students start to engage in behaviors associated with critical thinking. As a result, the use of data from first-year students is appropriate

for this study because many first-year students are capable and are engaged in critical thinking during the first year of college (Baxter Magolda, 1992; Chickering & Reisser, 1993).

Data Analysis and Variables

This section describes the data analysis techniques that were used to explore the research question. Descriptions of the variables being included in this study are also provided.

Data Preparation

Missing data occur frequently in social science and educational research that use surveys as a data collection method, and can have serious implications for the external validity of the results (Thompson, 2006). To assess the effect of missing data, the base sample, the sample that includes all cases, is compared to the analytic sample, the sample that includes only those cases with data for all variables. Differences in the two samples are assessed by comparing the means for continuous variables for the analytic and base samples and cell percentages for the categorical variables for the analytic and base samples.

The missing data analysis reveals that the analytic sample, the sample including only those cases with data for all variables, is representative of the base sample, so listwise deletion is used to remove cases with missing data from the analysis. The sample size reduces from 2763 first-year students to 2445 first-year students. Then, in accordance with the sampling method employed by Rowan-Kenyon, Soldner and Inkelas (2007), a sub-sample of students who did not participate in an L/L program (NPLL) is randomly selected reducing the number of NPLL participants in the sample to 211. The

random sample is taken in such a way that the proportion of NPLL participants from each institution is equal to the proportion of L/L program participants from the same institution. As a result the final analytic sample for this study includes 304 (48%) students who participated in RH programs, 122 (19%) students who participated in CSL programs, and 211 (33%) first-year students who did not participate in an L/L program, but lived in the residence halls.

Data Analysis

Means, standard deviations and ranges are calculated for all continuous variables. In addition, correlations are conducted to determine bi-variate relationships between all variables. In order to explore how different levels of program characteristics are associated with self-perceived critical thinking ability, an analysis of variance is conducted to assess mean differences across RH, CSL, and NPLL groups on peer and faculty interaction and residence hall climate variables.

The original research design called for the use of Hierarchical Linear Modeling (HLM) to answer the research question. HLM was deemed appropriate since the data from the NSLLP data set were collected through successive sampling, first of institutions then of students nested with in those institutions, a process known as multistage sampling (Hox, 2002; Inkelas et al., 2004). As a result the data reflect two different hierarchical levels; namely, the student and the institution. In this context, HLM would allow for the estimation of the model seeking to account for influence of both students' (level 1) and institutional characteristics (level 2) on students self-perceived critical thinking ability in a simultaneous manner (Umbach et al., 2005).

However, instead of using HLM, Ordinary Least Squares (OLS) regression is used to answer the research question. Basically, the sample in this study does not meet the criteria needed for using HLM. Heck and Thomas (2009) suggest that the use of HLM calls for at least 10 institutions and 30 participants from each institution. The sample in this study is made up of 8 institutions and 25% of the institutions have less than 30 participants. Another requirement for the use of HLM is one of substantial variability across institutions. The intraclass correlation (ICC) of critical thinking across the 8 institutions is .0098, which is substantially below the .05 threshold recommended in the literature (Heck & Thomas, 2009; Hox & Maas, 2005; Snijders & Bosker, 1999).

Astin and Denson (2009) suggest the use of OLS regression when the sample does not meet the criteria for HLM, the researcher is interested in temporal modeling of the variables, and the researcher is interested in examining the indirect or direct effects of an independent variable as was the case in this study. Following Astin and Denson's (2009) suggestion, OLS regression, in the form of Multiple Linear Regression (MLR), is used to answer the research question in this study with the variables entered into the equation in four separate blocks to assess how much of the variance in self-perceived critical thinking each set of variables predicts. The regression coefficient, R^2 is calculated to indicate how much of the variance in self-perceived critical thinking is explained by each model. In addition, the change in R^2 (ΔR^2) is calculated to assess how much more of the variance in self-perceived critical thinking is explained by each model over and above the previous model.

The dependent variable, self-perceived critical thinking, and all other continuous variables are standardized before being entered into the equation; this transformation

results in means of zero and standard deviations of one for all continuous variables. This transformation also produces unstandardized coefficients representing effect sizes. An effect size is the portion of a standard deviation change in the dependent variable that result from a one-unit change in an independent variable. As suggested by Rosenthal and Rosnow (1991), effect sizes of .10 or less are considered trivial, effect sizes that are greater than .10 and less than or equal to .30 are considered small, greater than .30 and less than or equal to .50, moderate and effect sizes greater than .50 are considered large.

A basic assumption of any type of MLR is that there is no multicollinearity, or strong relationships between any two or more predictors (Lomax, 1992). Multicollinearity is problematic because it can result in unstable regression coefficients, resulting in the magnitude and sign of estimates changing, or significant overall regression coefficients when none of the predictors are significant (Lomax, 1992). The variance inflation factor (VIF) for each predictor variable is computed to test for multicollinearity. Any VIF value greater than 10 signifies the presence of multicollinearity. None of the variables included in the study produce VIF values of greater than 10 and consequently none are removed as explained in the results chapter.

Models.

Two multiple linear regressions analyses are employed in this study. The first MLR is used to determine the amount of the variance in self-perceived critical thinking accounted for by L/L program participation above and beyond all other input and environmental variables. The second MLR is used to explore how much of the variance in self-perceived critical thinking explained by L/L program participation is due to the peer and faculty interaction and residence hall climates associated with L/L programs.

Because the critical thinking variable is standardized, effect sizes are used in both analyses to compare differences in the relationship of self-perceived critical thinking and participation in RH programs versus CSL programs and non-participation in L/L programs.

Based on the suggestion of Astin and Denson (2009), the data are entered into the model in blocks in the first MLR analysis (See Table 3). By entering the variables into the model in separate blocks, it is determined if each new block of variables explained any of the variance in self-perceived critical thinking by examining if additional blocks add to the proportion of variance explained. Astin's (1993) I-E-O model for studying student outcomes and the suggestions of Astin and Denson (2009) are used to determine the order in which the variables are entered into the regression equation. Change is determined by comparing students' input characteristics at their time of entry into the institution with their outcome characteristics after they have been exposed to the environment (Astin, 1993; Astin & Denson, 2009). Consistent with Astin and Denson's (2009) suggestion, student entry characteristics are entered into the model in block 1, the Inputs Block, followed by institutional characteristics in the second block, the Involvement and Institution Block. Because the literature shows the particular importance of peer and faculty interaction and residence hall climate on the development of critical thinking ability, they are entered in the third block separately from all other environmental variables creating the Interaction and Climate block. By entering peer and faculty interaction and residence hall climate variables alone into block 3, the amount of the proportional variance they explain can be assessed. Finally, L/L program variables

are included in the fourth and final block to determine the proportion of the variance in critical thinking they account for over and above all other variables.

Table 3

Variables Entered Into the Regression Equation by Block

Block	Variable
Block 1 Inputs	Race/Ethnicity: African American (AA) Race/Ethnicity: Asian/Pacific Islander (APA) Race/Ethnicity: American Indian (AI) Race/Ethnicity: Hispanic/Latino (LAT) Race/Ethnicity: Multi-Racial/Ethnic (MULTI) Race/Ethnicity: Race/Ethnicity not Listed (RANON) Gender: Male Parent's Education: Associates Degree or Less (<BA) Parent's Education: Masters Degree or More (>BA) Parents' Income: Low (ILOW) Parents' Income: High (IHIGH) High School Grades (HSGRADES) Pre-College Confidence in Cognitive Skills (PRECOG)
Block 2 Environment: Involvement & Institution	Involvement in Work (INVWORK) Involvement in Varsity Sports (INVSPT) Involvement in Fraternities/Sororities (INVFS) Involvement in Community Service (INVCOM) Location: Midwest (LOCMW) Selectivity (SELECT) Size (SIZE) Investment in Student Services (INVEST)
Block 3 Environment: Interaction & Climate	Peer Interaction: Academic (PEERACA) Peer Interaction: Social (PEERSOC) Faculty Interaction: Course Related (FACCRS) Faculty Interaction: Mentorship (FACMENT) Residence Hall Climate: Academic (RESCLACA) Residence Hall Climate: Social (RESCLSOC)
Block 4 Environment: L/L Program	L/L Program: Civic/Social Leadership (CSL) L/L Program: Non-Participation

The following are the regression equations for each block included in the MLR. All input characteristics are entered into the first block.

$$Y_i = a + b_1(AA) + b_2(APA) + b_3(AI) + b_4(LAT) + b_5(MULTI) + b_6(RANON)$$
$$+ b_7(MALE) + b_8(<BA) + b_9(>BA) + b_{10}(ILOW) + b_{11}(IHIGH)$$
$$+ b_{12}(HSGRADES) + b_{13}(PRECOG) + r_i$$

The second block, Involvement and Institution block, of the regression equation model contains all variables entered in the first block and involvement in campus work, involvement in varsity sports, involvement in a social fraternity/sorority, participation in on going community service and institutional variables.

$$Y_i = a + b_1(AA) + b_2(APA) + b_3(AI) + b_4(LAT) + b_5(MULTI) + b_6(RANON)$$
$$+ b_7(MALE) + b_8(<BA) + b_9(>BA) + b_{10}(ILOW) + b_{11}(IHIGH)$$
$$+ b_{12}(HSGRADES) + b_{13}(PRECOG) + b_{14}(INWORK) + b_{15}(INVSPT)$$
$$+ b_{16}(INVFS) + b_{17}(INVCOM) + b_{18}(LOCMW) + b_{19}(LOCFW) + b_{20}(SELECT)$$
$$+ b_{21}(SIZE) + b_{22}(INVEST) + r_i$$

Peer and faculty interaction, and residence hall climate have been shown to have significant influence on the development of critical thinking ability. As a result, it is particularly important to assess their influence and so they are entered into the third block, Interaction and Climate block, of the model.

$$Y_i = a + b_1(AA) + b_2(APA) + b_3(AI) + b_4(LAT) + b_5(MULTI) + b_6(RANON)$$
$$+ b_7(MALE) + b_8(<BA) + b_9(>BA) + b_{10}(ILOW) + b_{11}(IHIGH)$$
$$+ b_{12}(HSGRADES) + b_{13}(PRECOG) + b_{14}(INWORK) + b_{15}(INVSPT)$$
$$+ b_{16}(INVFS) + b_{17}(INVCOM) + b_{18}(LOCMW) + b_{19}(LOCFW) + b_{20}(SELECT)$$
$$+ b_{21}(SIZE) + b_{22}(INVEST) + b_{23}(RESCLACA) + b_{24}(RESCLSOC)$$

$$+ b_{25}(\text{PEERACA}) + b_{26}(\text{PEERSOC}) + b_{27}(\text{FACCRS}) + \beta_{28}(\text{FACMENT}) + r_i$$

Finally, L/L program participation is entered into the model in the fourth block, L/L Program block, allowing for an assessment of the influence of L/L program participation on critical thinking ability over and above all other variables.

$$Y_i = a + b_1(\text{AA}) + b_2(\text{APA}) + b_3(\text{AI}) + b_4(\text{LAT}) + b_5(\text{MULTI}) + b_6(\text{RANON})$$
$$+ b_7(\text{MALE}) + b_8(<\text{BA}) + b_9(>\text{BA}) + b_{10}(\text{ILOW}) + b_{11}(\text{IHIGH})$$
$$+ b_{12}(\text{HSGRADES}) + b_{13}(\text{PRECOG}) + b_{14}(\text{INWORK}) + b_{15}(\text{INVSPT})$$
$$+ b_{16}(\text{INVFS}) + b_{17}(\text{INVCOM}) + b_{18}(\text{LOCMW}) + b_{19}(\text{LOCFW}) + b_{20}(\text{SELECT})$$
$$+ b_{21}(\text{SIZE}) + b_{22}(\text{INVEST}) + b_{23}(\text{RESCLACA}) + b_{24}(\text{RESCLSOC})$$
$$+ b_{25}(\text{PEERACA}) + b_{26}(\text{PEERSOC}) + b_{27}(\text{FACCRS}) + \beta_{28}(\text{FACMENT})$$
$$+ b_{29}(\text{CSL}) + b_{30}(\text{NPLL}) + r_i$$

The first and second MLR analyses are identical, except that in the second MLR the L/L program block is entered third and the Interaction and Climate block is entered last. Switching the order in which the variables are entered makes it possible to draw a comparison of the amount of the variance in self-perceived critical thinking explained by L/L program participation prior to peer and faculty interaction and residence hall climate to the amount of variance explained by L/L program participation after these variables are included. In addition, differences in the relationship of self-perceived critical thinking ability and participation in RH versus CSL programs and non-participation in L/L programs under each condition can also be examined.

Variables

The following section describes the variables included in this study. The variables are discussed separately according to the following groupings in Astin's (1993)

I-E-O model for assessing college impact: inputs, environments, and outcomes. Definitions are provided as well as identification of variables as either a student level or institutional level variable. Astin (1993) argues that one of the most difficult tasks is to identify which input and environmental factors are most appropriate to include in the analysis in order to provide the greatest level of strength to the findings without complicating the model. The variables that are included in this study are identified through the literature as potentially having an influence on the development of critical thinking ability. Because the data were obtained from 8 different institutions, it is important to consider organizational variables that can influence critical thinking. Astin (1993) indicates that taking entry characteristics and environmental characteristics, including organizational characteristics, into account allows for the influence of the primary independent variable to be assessed with greater confidence.

Outcome variable.

The outcome or dependent variable employed in this study is the self-perceived critical thinking ability of students in the first half of the second semester of their first year in college. As already mentioned, this outcome is standardized to facilitate estimation of effect sizes. In this study critical thinking is defined as the process of making purposeful, self-regulatory judgments through interpretation, analysis, evaluation, inference, and explanation motivated by the disposition to habitually engage in these behaviors. This definition is based on the work of Facione (1990), Jones et al. (1995) and Paul and Nosich (1991). Self-perceived critical thinking is a composite of six questions created by Inkelas et al. (2004). These six questions capture self-assessment about searching for meaning to new ideas, disagreeing with the authors of readings, challenging

professors' statements and developing ones own ideas or points of view. These six questions were found by Inkelas and her associates to measure a single factor with an acceptable Cronbach's alpha of .707 (See Table 4).

Table 4

Self-Perceived Critical Thinking Composite

Survey Question	2003 Pilot Factor Loading	2003 Pilot Cronbach Alpha	2004 NSLLP Cronbach Alpha
		.725	.707
Explore meaning of facts when introduced to new ideas	.608		
Have disagreed with author of book/article was reading	.581		
Challenge profs statements before accept as right	.542		
Develop own opinions by analyzing +/- of diff points of view	.536		
Enjoy discussing issues with people who disagree with me	.475		
Prefer courses requiring organized/interpret ideas over facts	.369		

Note. Inkelas et al., (2004)

Cronbach's alpha scores range from 0 to 1 and represent the extent to which the questions included in a composite measure the same concept (Pedhazur & Schmelkin, 1991). The closer the Cronbach's alpha score is to one, the more the questions are related to the same concept. George and Mallory (2003) suggest the following guide for assessing Cronbach's alpha scores: "≥.9-Excellent, ≥.8-Good, ≥.7-Acceptable, ≥.6-Questionable, ≥.05-Poor, and <.5-Unacceptable" (p.231). Based on George and Mallory's guidelines only composites with Cronbach's alpha scores of .7 or higher will be used in this study.

Participants responded to the statements composing the self-perceived critical thinking ability composite by indicating how much they agreed with each statement. The scale of the responses is ordinal ranging from Strongly Disagree to Strongly Agree (Strongly Disagree = 1, Disagree = 2, Agree = 3, Strongly Agree = 4). The composite does not perfectly represent critical thinking; however, each question represents some elements of critical thinking as defined in this study (See Table 5). The internal validity of the factor was strengthened by rejecting rotated factors with eigen values less than 1 (Inkelas, Vogt, Longerbeam, Owen and Johnson, 2006). In addition, 15 living and learning program directors from different campuses reviewed the self-perceived critical thinking factor and determined that it had face validity (Inkelas, Vogt, Longerbeam, Owen and Johnson, 2006).

Table 5

Elements of Critical Thinking Represented in the Composite

Survey Question	Critical Thinking Elements
Explore meaning of facts when introduced to new ideas	Analysis, Evaluation & Inference
Have disagreed with author of book/article was reading	Evaluation
Challenge profs statements before accept as right	Analysis & Evaluation
Develop own opinions by analyzing +/- of different points of view	Interpretation, Analysis, Evaluation, Inference & Explanation
Enjoy discussing issues with people who disagree with me	Disposition
Prefer courses requiring organized/interpret ideas over facts	Interpretation, Disposition

It is also important to note that the questions included in the self-perceived critical thinking composite may be more descriptive of masculine ways of knowing than feminine ways of knowing. Baxter Magolda (1992) found that male students tend to be

more competitive, while female students tend to be more collaborative. Two of the questions included in the composite, challenge professors statements and discussing issues with people who disagree, are more competitive in nature. As a result, they may elicit different responses from male and female participants.

Input variables.

Astin (1993) defines input variables as the characteristics students possess at the time they enter the institution. Input variables are fixed, such as gender and ethnicity or unfixed, such as level of academic achievement and critical thinking ability (Astin, 1991). Measuring input variables provides a foundation on which the influence of college environments on student characteristics can be assessed (Astin, 1991). Input variables that may influence the development of critical thinking ability are taken into account by entering them into the first block of the regression model.

Variables with nominal scales are recoded to create categorical variables. Input variables that are controlled included: gender, race/ethnicity, parents' highest level of education, parents' total income, self reported average high school grades, pre-college confidence in cognitive skills. Gender is recoded so that Male=1 and Female=0. Since all racial/ethnic status groups except for Asian/Pacific Islander and White have sample sizes of less than 30, African American, American Indian, Hispanic/Latino, Multi-Racial/Ethnic, and participants who reported that their Race/Ethnicity was not listed are combined into one group termed Minority. Racial/ethnic status is recoded into categorical binary variables, yielding two new dummy-coded variables. They are Asian/Pacific Islander (Asian/Pacific Islander=1, else=0) and Minority (Minority=1, else=0). White, the variable representing White participants, is left out of the equation to

serve as the comparison group. Parents' education is binary coded: Associates Degree or Less (Associates Degree or Less=1, else=0), and Masters Degree or More (Masters Degree or More=1, else=0). The group Bachelors, the variable representing students whose parents had only achieved a Bachelors degree, is left out of the equation as the comparison group. Parents' total income is grouped into three categories by breaking down the sample from the NSLLP into thirds. Parents with a total income in the lowest third, $59,999 or less, are placed in the Low Income group, those with incomes in the middle third, $60,000 to $99,999, are designated Middle Income and those in the highest quartile, $100,000 or more, are placed in the High Income group. The income variable is recoded into two dummy coded variables (Low Income =1, else=0 and High Income=1, No=0). Middle Income, the variable representing participants whose parents' income is in the middle third, is left out of the equation as the comparison group.

Because the 2004 NSLLP data set was collected during one period of time a pre-college measure of participants' critical thinking ability is not available. However, in the case where students are asked to self report and pre-test data is not available, a pre-college measure of students' openness or receptivity to critical thinking is sufficient to represent pre-college critical thinking, as long as other input variables such as those listed above are also taken into account (Pascarella, 2001). However, since the data was collected at one point in time, no causal conclusions are drawn and instead the findings are used to further explore the relationship between RH program and CSL program participation and self-perceived critical thinking. Inkelas et al. (2004) created a pre-college confidence in cognitive skills composite to assess receptivity to the critical thinking process with a good Cronbach's alpha score of .809 (Table 6).

Table 6

Pre-College Confidence in Cognitive Skills Composite

Survey Question	2003 Pilot Factor Loading	2004 NSLLP Cronbach Alpha
		.809
Analyzing new ideas and concepts	.808	
Enjoy challenge of learning new material	.761	
Applying class material to "real world"	.706	
Handling challenge of college-level work	.702	
Appreciating new and different ideas, beliefs	.580	
Feeling as though you belong on campus	.441	

Note. Inkelas et al., (2004)

Pre-college confidence in cognitive skills is rated on an ordinal scale ranging from Not at all Confident to Very Confident. Each response is assigned a number in a manner consistent with the critical thinking ability scale (Not at all Confident = 1, Somewhat Confident = 2, Confident = 3, Very Confident = 4).

Environmental variables.

Environmental variables are defined by Astin (1993) as the various aspects of the college experience to which students are exposed. These variables take many forms including classroom and co-curricular experiences, institutional characteristics, and policies (Astin, 1993). According to Astin (1993), the difference between students' input characteristics and their outcome characteristics are due to the influence or effect of environmental variables. As a result, environmental variables, including organizational variables, shown through the literature to affect critical thinking ability are taken into account so the influence of L/L program participation can be isolated.

L/L program participation. The environmental variable of primary interest to this study is L/L program participation. Since L/L program participation is a categorical variable, it is recoded into categorical binary variables yielding two new dummy-coded variables CSL (CSL=1, else=0) and non-participation in L/L programs (NPLL=1, else=0). Residential Honors program is left out of the equation to serve as the comparison group. Other environmental variables that are controlled included: involvement working on campus, involvement in varsity sports, involvement in a social fraternity/sorority, participation in on-going community service, institutional investment in student services, institutional size, institutional selectivity, institutional location, peer interaction, faculty interaction perception of residence hall social climate, and perception of residence hall academic climate.

Involvement. All environmental variables concerning students' involvement in working on campus, varsity sports, social fraternity/sorority, and on-going community service are recoded (involved=1 and not involved=0).

Structural characteristics. Berger and Milem (2000) identify structural demographic institutional characteristics that are important to take into account when assessing college impact on students. These characteristics may directly affect the student experience or may indirectly affect students by influencing who attends the institution and therefore influence the make up of the peer group, an important influence on college outcomes. These characteristics include size (number of full-time equivalent students enrolled), control (public or private), selectivity (the academic ability of students admitted to the institution), Carnegie type and location. Carnegie type and control will

not be included as variables in these analyses because all eight institutions included in the study are classified as Carnegie type Research Extensive, and are public institutions.

According to the Integrated Postsecondary Education Data System (IPEDS), the geographic locations of the institutions involved in this study are New England, Mid East, Southeast, Great Lakes, and Plains. To increase the number of institutions represented by each geographic location institutions in the New England, Mid East and Southeast will be combined into a new variable East, institutions in the Great Lakes and Plains will be combined into a new variable Midwest. Location is recoded to create one binary variable Midwest (Midwest=1, else=0). East is left out of the equation as the comparison group.

The variable Size represents the full time equivalent enrollment at each institution in the fall of 2003 according to IPEDS. In addition Selectivity represents the average SAT score of students enrolled in the fall 2003 semester. This information was obtained through contact with the admissions offices at the institutions involved in this study and the 26th edition of *Barron's Profile of American Colleges*.

Institutional expenditure on student services. In addition, Astin (1993) suggests the inclusion of the percentage of total expenditures invested in student services as well. The amount of financial resources an institution devotes to student services, such as L/L programs, may impact the quality of the student services provided, and as a result have significant impacts on student outcomes (Astin, 1993). In addition, many schools have at least an RH program or a CSL program, but much fewer have both. The NSLLP data set includes 22 institutions that have at least an RH or a CSL program, but only 8 institutions have usable data on both. It is possible that the institutions involved in this study, 8

institutions that have both RH and CSL programs, have both types of programs because they can afford to spend more on student services than institutions that only have either an RH or CSL program. Such differences in resources expended on student services such as L/L programs might impact the ability of the results to be generalized to institutions that have fewer resources.

As a result, institutional investment in student services is included as a variable in this study. Institutional investment in student services data as well as all other institutional level data, except for selectivity, was gathered from IPEDS for the institutions involved in the study. The one exception is that Pennsylvania State University (PSU) does not report institutional investment in student services to IPEDS. This fact is included in this dissertation at the request of PSU. As a result, the average institutional investment in student services for PSU was calculated by adding the 2004 fiscal year budget for academic support and student services and dividing it by the total number of FTE students. These data were obtained from the PSU website.

Peer interaction. Peer interaction refers to the frequency and types of contact in or outside of the classroom among students (Astin, 1993; Pascarella & Terenzini, 2005). Factors representing peer interaction involving discussions of academic and career issues and discussions of socio-cultural issues were created by Inkelas et al. (2004), and have acceptable to good Cronbach's alpha scores of .737 and .864 respectively (see Table 7). The scale of the variables used to create the composites for peer interaction is ordinal with responses ranging from Never to Once or More a Week (Never = 1, A few times a semester = 2, A few times a month = 3, Once or more a week = 4).

Table 7

Peer Interaction Composites

Survey Question	2003 Pilot Factor Loading	2003 Pilot Cronbach Alpha	2004 NSLLP Cronbach Alpha
Discussed Academic and Career Issues with Peers		.751	.737
Discussed something learned in class	.743		
Shared concerns about classes and assignments	.725		
Talked about current news events	.672		
Talked about future plans and career ambitions	.497		
Discussed Socio-Cultural Issues with Peers		.864	.864
Discussed social issues such as peace, human rights, justice	.760		
Discussed with students whose personal values different from own	.726		
Discussed views about multiculturalism and diversity	.721		
Held discussions with those with different religious beliefs	.703		
Talked about different lifestyles and customs	.702		
Discussions with students whose political opinions very different from own	.697		

Note. Inkelas et al., (2004)

Faculty interaction. Similar to peer interaction, faculty interaction refers to the frequency of various types of contact in or outside of the classroom between students and faculty (Astin, 1993; Pascarella & Terenzini, 2005). The two factors representing course related faculty interaction and faculty mentorship were created by Inkelas et al. (2004) and have acceptable Cronbach's alpha scores of .767 and .746 respectively (see Table 8). The scale of the variables used to create the composite for faculty interaction is ordinal with responses ranging from Never to Once or More a Week (Never = 1, A few times a semester = 2, A few times a month = 3, Once or more a week = 4).

Table 8

Faculty Interaction Composites

Survey Question	2003 Pilot Factor Loading	2003 Pilot Cronbach Alpha	2004 NSLLP Cronbach Alpha
Course-related faculty interaction		.763	.767
Visited informally with instructor before/after class	.692		
Made appt. to meet instructor in his/her office	.673		
Asked instructor for info related to course	.620		
Communicated with instructor via email	.591		
Faculty mentorship		.775	.746
Worked with instructor on independent project	.724		
Worked with instructor involving his/her research	.592		
Discussed personal problems or concerns with instructor	.534		
Visited informally with instructor on a social occasion	.532		
Went to a cultural event with instructor for class	.531		
Discussed career plans & ambitions with instructor	.478		

Note. Inkelas et al., (2004)

Residence hall climate. Residence hall climate is defined by Schroeder, Mable and associates (1994) as the conditions of a residence hall setting including support, growth opportunities and the change process, as they are perceived by the residents of that environment. These conditions can be either social or academic (Schroeder, Mable & associates, 1994). Factors representing academically supportive and socially supportive residence hall climates were created by Inkelas et al. (2004) and have good Cronbach's alpha scores of .808 and .868 respectively (See Table 9). The scale of the variables in the composite for residence hall climate is ordinal with responses ranging from Strongly Disagree to Strongly Agree (Strongly Disagree = 1, Disagree = 2, Agree = 3, Strongly Agree = 4).

Table 9

Residence Hall Climate Composites

Survey Question	2003 Pilot Factor Loading	2003 Pilot Cronbach Alpha	2004 NSLLP Cronbach Alpha
Academically supportive		.793	.808
Environment supports academic achievement	.706		
Most students study a lot	.612		
Most students value academic success	.555		
It's easy to form study groups	.529		
Adequate study space available	.513		
Staff helps with academics	.501		
Socially supportive		.867	.868
Appreciate different races/ethnicities	.747		
Appreciate different religions	.705		
Help and support one another	.699		
Would recommend this residence hall	.584		
Intellectually stimulating environment	.548		
Different students interact with each other	.545		
Appreciation for different sexual orientation	.544		
Peer academic support	.481		

Note. Inkelas et al., (2004)

Summary

This chapter provided an overview of an empirical study that was designed to explore the association of students' self-perceived critical thinking ability with participation in Residential Honors (RH) programs versus the association of students' self-perceived critical thinking ability and Civic/Social Leadership (CSL) programs and non-participation in living and learning programs (NPLL). A detailed discussion of the purpose of the study, research question and hypothesis, conceptual model, research design, and data analysis were included. The next chapter reports the results of the analyses described in this chapter. The results chapter first discusses the preliminary

descriptive analysis, the impact of missing data, and correlations between bivariate-pairs. Finally, the results of the two multiple linear regression analysis are discussed.

Chapter IV:

Results

The purpose of this study is to explore the association of students' self-perceived critical thinking ability with participation in Residential Honors (RH) living-learning (L/L) programs versus self-perceived critical thinking ability with Civic/Social Leadership (CSL) L/L programs and also with non-participation in living-learning programs (NPLL). This chapter first provides a profile of the sample; specific emphasis is placed on contrasting the type of students who participate in Residential Honors (RH) programs versus Civic/Social Leadership (CSL) programs and students who do not participate in L/L programs (NPLL). Next, the results of missing data are explored. Then, correlations between variables are described to provide a foundation for the analysis and to assess the extent of multicollinearity. This description is followed by a report of the results of two multiple linear regression analyses, which employ Astin's (1991) I-E-O model, to examine the association between L/L program participation and self-reported critical thinking ability. Finally a summary of this chapter is provided.

Profile of the Sample

Overall Profile

The participants in this study are 637 first year students drawn from eight different institutions of higher education that have both RH and CSL programs on their campuses. These students participated in the National Study of Living-Learning Programs (NSLLP) that collected survey data in the first half of the spring semester of 2004. A summary of key sample demographic characteristics are presented in Table 10.

Table 10

Sample Demographic Characteristics

Characteristic	Frequency	Percent	Mean	S.D.
Inputs:				
Gender				
Male	232	36.0		
Female	405	64.0		
Race/Ethnicity				
African American	21	3.3		
Asian/Pacific Islander	46	7.0		
American Indian	2	0.3		
Hispanic/Latino/a	12	2.0		
White	528	83.0		
Multi-Racial	21	3.3		
Race Not Listed	7	1.1		
Parents' Education				
Associates or Less	155	24.0		
Bachelors	191	30.0		
Masters or More	291	46.0		
Parents' Income				
Low Income	193	30.0		
Middle Income	185	29.0		
High Income	259	41.0		
Pre-College Con. in Cog. Skills			17.25	3.16
High School Grades			5.41	0.78
Environment:				
Involvement				
Involved in Fraternity/Sorority	84	13.0		
Not Involved in Fraternity/Sorority	553	87.0		
Involved in Varsity Sports	30	5.0		
Not Involved in Varsity Sports	607	95.0		
Involved in Campus Employment	137	21.0		
Not Involved in Campus Employment	500	79.0		
Involved in Community Service	154	24.0		
Not Involved in Community Service	483	76.0		
Discussed Aca. & Career with Peers			13.02	2.29
Discussed Socio-Cult. with Peers			15.35	4.59
Course-related faculty interaction			8.22	2.20
Faculty mentorship			7.63	2.19
Res. Hall is Academically Supportive			16.87	3.44
Res. Hall is Socially Supportive			22.93	2.54
Living-Learning Program Participation				
Residential Honors Programs	304	48.0		
Civic/Social Leadership Programs	122	19.0		
Non-Participation	211	33.0		
Outcome: *Self-Perceived Critical Thinking*			16.96	2.63

As can be seen in Table 10, most participants are part of RH programs (48%) while CSL program participants make up 19% and students who do not participate in any L/L program made up 33% of the sample. The sample is more female than male with women making up 64% while men only made up 36% of the sample. White students (83%) have the highest representation of all racial groups followed by, Asian/Pacific Islanders (7%), African Americans (3.3%), participants identifying as Multi-Racial (3.3%), Hispanic/Latinos (1.9%), students whose race/ethnicity was not listed (1.1 percent) and American Indians (.3 percent).

The results also show that the socioeconomic status of the sample is high with more students having one or more parents with at least a Masters degree (46%), and more students with parents in the highest income group (41%) than any other category. The second largest parent education group is made up of study participants who have one or more parents at least a Bachelors degree (30%), followed by students who have parents with an Associates degree or less (24%). The total annual income of participants' parents is split into three categories, Low ($59,999 or less), Middle ($60,000 to $99,999) and High ($100,000 or more) with the largest number of participants in the High Income group (41%), followed by 30% in the Low Income group and 29% in the Middle Income group.

On average study participants are confident in their pre-college cognitive skills (M=17.25, SD= 3.16) and report having an A- average in high school. Participants also indicate that on average they discuss academic and career issues (M=13.02, SD= 2.29), as well as socio-cultural issues with peers (M=15.35, SD= 4.59) once a week or more. Also, on average, participants indicate that they have course related interactions with

faculty a few times a month (M=8.22, SD= 2.20), but only experience faculty mentorship a few times a semester (M=7.63, SD= 2.19). The average participants also agree that the climate of their residence halls climate is academically supportive (M=16.87, SD= 3.44), and strongly agree that it is socially supportive (M=22.93, SD= 2.94). Finally, on average, participants agree that they engage in critical thinking (M=16.96, SD= 2.63). Descriptions of these composites are presented in the methodology chapter.

Differences in the Profile of Student Inputs by Program

Cross-tabulations are included to provide further information about the characteristics of the participants in RH programs, CSL programs and students who do not participate in any L/L program. The results reveal that men are over represented in RH programs while women are over represented among students who do not participate in an L/L program ($\chi^2(1, N=637) = 8.47$, $p<.05$). Asian/Pacific Island participants are over represented in RH and underrepresented in CSL programs ($\chi^2(1, N=637) = 6.68$, $p<.05$). High income students are overrepresented in RH programs and underrepresented in CSL programs ($\chi^2(1, n=637) = 15.15$, $p<.001$), while low income students are overrepresented in CSL programs and underrepresented in RH programs ($\chi^2(1, n=637) = 14.57$, $p<.001$). Similarly, participants with one or more parents who have attained at least a Masters degree were overrepresented among RH program participants and underrepresented among CSL and NPLL students ($\chi^2(1, n=637) = 19.08$, $p<.001$). Conversely, participants whose parents most attained an Associates degree are overrepresented among NPLL students and CSL program participants and underrepresented among RH program participants ($\chi^2(1, n=637) = 10.03$, $p<.01$).

A one-way analysis of variance (ANOVA) is included in the study to examine differences in the pre-college confidence in cognitive skills and high school grades among RH program participants, CSL program participants and NPLL students. The results of the ANOVA reveal significant mean differences among the groups of participants as shown in Table 11. Tukey HSD and Tamhane post hoc tests provide further insight into the mean differences (see Table 12).

Table 11

Continuous Input Variable Differences Among L/L Programs

Variable	F	p
Pre-College Confidence in Cognitive Skills	19.541	.000
High School Grades	45.085	.000

The post-hoc tests reveal that RH program participants are more confident in their pre-college cognitive skills than students who do not participate in any L/L program and show that RH students have higher high school grades than both CSL program participants and NPLL (see Table 12). The effect size of all of these mean differences is large. In addition, CSL program participants report greater pre-college confidence in cognitive skills than do NPLL students. This difference is moderate. However, because this analysis does not control for the influence of other variables, an accurate understanding of the difference between groups can not be attained. Therefore multiple linear regression analyses are needed to provide a more thorough comparison by also taking other important variables into account.

Table 12

Continuous Input Variable Mean Differences Among L/L Programs

Variable	L/L Program		Mean Difference	Effect Size
Pre-College Confidence in Cognitive Skills	RH	NPLL	.521***	Large
		CSL	.038	
	CSL	NPLL	.484***	Moderate
High School Grades	RH	NPLL	.710***	Large
		CSL	.699***	Large
	CSL	NPLL	.011	

*** p<.001, **p<.01, *p<.05

The results show some interesting differences among RH, CSL and NPLL students. RH program participants are more likely than CSL and NPLL students to have parents who earn a high income and one or more of whom have attained at least a Masters degree. Conversely, CSL and NPLL students are more likely than RH program participants to have parents who earn a low income and have attained at most an Associates degree. In addition, RH program participants have greater confidence in their pre-college cognitive skills than NPLL students, and report higher high school grades than both CSL program participants and NPLL students. These results provide important context for understanding the participants making up these groups and the capital they bring their L/L program experience.

Comparison of Environmental Effects by Program

A one-way analysis of variance (ANOVA) is used to examine differences in perception of residence hall climate, and peer and faculty interaction among RH program participants, CSL program participants and NPLL students. This analysis identifies

differences in participants' experiences that could be used to propose possible explanations for differences in the relationship between self-perceived critical thinking and RH program participation versus CSL program participation and non-participation in L/L programs.

The results of the ANOVA reveal significant mean differences among RH program participants, CSL program participants and NPLL students on peer interaction and residence hall climate variables (see Table 13). Tukey HSD and Tamhane post hoc tests are used to further explore these differences. The results of the post hoc tests are found in Table 14.

Table 13

L/L Program Differences on Interation and Climate Variables

Variable	F	p
Discussed Academic and Career Issues with Peers	27.492	.000
Discussed Socio-Cultural Issues with Peers	40.358	.000
Course-related faculty interaction	.740	.478
Faculty Mentorship	2.320	.099
Residence Hall is Academically Supportive	25.364	.000
Residence Hall is Socially Supportive	23.102	.000

Post hoc tests reveal that on average RH and CSL program participants report discussing academic and career issues as well as socio-cultural issues with peers more often than NPLL students. The differences between scores of RH program and NPLL

students are significant and large for both peer interaction variables, while the differences between scores of CSL program and NPLL students were significant and large for discussing socio-cultural issues and significant and moderate for discussing academic

Table 14

L/L Program Mean Differences on Interaction and Climate Variables

Variable	L/L Program		Mean Diff.	Effect Size
Discussed Academic and Career Issues with Peers	RH	NPLL	.635***	Large
		CSL	.190	
	CSL	NPLL	.445***	Moderate
Discussed Socio-Cultural Issues with Peers	RH	NPLL	.735***	Large
		CSL	.086	
	CSL	NPLL	.649***	Large
Residence Hall is Academically Supportive	RH	NPLL	.612***	Large
		CSL	.323**	Moderate
	CSL	NPLL	.289*	Small
Residence Hall is Socially Supportive	RH	NPLL	.585***	Large
		CSL	.312**	Moderate
	CSL	NPLL	.274*	Small

*** p<.001, **p<.01, *p<.05

and career issues. Residential Honors program report reported that their residence hall climate was more academically and socially supportive on average than CSL program and NPLL students. The mean differences between RH program participants' and NPLL students' scores are significant and large for both climate variables, while the mean differences between RH and CSL program participants' scores are significant and moderate. Civic/Social Leadership program participants also report that their residence hall climate was more academically and socially supportive than do NPLL students. The

mean differences between scores of CSL program and NPLL students are significant and small.

However, because the ANOVAs do not control for the influence of other variables, an accurate understanding of the difference between groups can not be attained. As a result, multiple linear regression analyses are also conduct to provide a more thorough comparison by taking other important variables into account as described later in this chapter.

Missing Data Analysis

A total of 2763 first-year students that participated in RH programs (429) CSL programs (178), or did not participate in any living-learning programs (2156) took part in the 2004 NSLLP survey conducted in the first half of the 2004 spring semester. The students are from eight institutions. As is often the case in survey research, missing data results from participants not answering every survey question. In this study cases with missing data are eliminated through listwise deletion. As a result, the sample is reduced to 2445 participants including 304 RH program participants, 122 CSL program participants, and 2019 NPLL students. Then, in accordance with the sampling method employed by Rowan-Kenyon, Soldner and Inkelas (2007), a sub-sample of NPLL students is randomly selected reducing the number of NPLL students in the sample to 211. The random sample is taken in such a way that the proportion of NPLL students from each institution was equal to the proportion of L/L program participants from the same institution.

The impact of the elimination of cases on the ability of the sample to be representative is investigated in two ways. First, cross-tabulations analysis is used to

determine if any difference exists between dropped and included cases for each categorical variable. Participants involved in fraternities and sororities ($\chi^2(1, N=2528) = 9.35, p<.05$), those involved in varsity sports ($x^2(1, N=2525) = 10.85, p<.05$), African-Americans ($\chi^2(1, N=2183) = 8.96, p<.05$), and participants whose parents have an Associates degree or less ($\chi^2(1, N=2139) = 12.76, p<.05$) are underrepresented in the included cases. In addition, participants involved in community service ($\chi^2(1, N=2507) = 11.21, p<.05$), males ($\chi^2(1, N=2185) = 12.60, p<.05$), and participants with one or more parents with an educational level of at least a Masters degree ($\chi^2(1, N=2139) = 10.05, p<.05$) are over represented in the included cases. However, as shown in Table 15, the distribution of cases is similar between included and dropped cases with the exception of African Americans whose representation among included cases is only half as much as this group's representation in the dropped cases.

Table 15

Percentage of Included and Dropped Cases

Variable	Included	Dropped
Inputs		
Gender: Male	36%	20%
Race: African American	3.3%	6.5%
Parent Education: Associates or Less	24%	31%
Parent Education: Masters or More	46%	39%
Environment		
Involved: Fraternity Sorority	13%	19%
Involved: Varsity Sports	5%	9%
Involved: Community Service	24%	20%

However, since race is a categorical variable, attempts to use imputation to increase the representation of African Americans in the included cases would be inappropriate. As a result, the under representation of African Americans in this study is a limitation of this study and should be considered when interpreting the results. Independent Samples T-tests are also conducted to assess differences between included and dropped cases on the continuous variables. Prior to these analyses the variables are standardized so effect sizes of mean differences can be examined. As shown in Table 16, six of the eight continuous variables have significant mean differences between the cases included in the study and dropped cases.

Table 16

Mean Differences Between Dropped and Included Cases

Variable	Mean Difference	Effect Size
Inputs		
High School Grades	.27	Small
Environment		
Discussed Academic and Career Issues w/Peers	.11	Small
Discussed Socio-Cultural Issues w/Peers	.17	Small
Course-related faculty interaction	-.11	Small
Residence Hall is Academically Supportive	.34	Moderate
Residence Hall is Socially Supportive	.23	Small

The analytic sample has higher mean scores than the base sample for all six variables. However, with the exception of a moderate difference between included cases and dropped cases for the perception of an academically supportive residence hall climate, all mean differences are small (.10-.30). Upon further examination of the

unstandardized scores for perception of an academically supportive residence hall climate, the mean scores for dropped (M=15.68) and included cases (M=16.87) are found to be similar. As a result, since differences are found to be small, and mean scores between dropped and included cases are similar, listwise deletion of cases with missing data is appropriate.

Correlations

Correlations are conducted to determine the extent to which bivariate pairs covary (see Table 17). The strength of each correlation is interpreted using the following criteria: 0 to .30 are trivial, .31 to .50 are low, .51 to .70 are moderate, .71 to .90 are high, and .91 to 1 are considered very high (Hinkle, Wiersma & Jurs, 1994). These analyses are useful because they demonstrate the relationship between variables prior to controlling for other variables. In addition they provide insight into multicollinearity, strong relationships between predictors. Since any type of MLR assumes observations are independent, multicollinearity can pose a threat to the validity of the findings.

Multicollinearity

The correlation analysis produces results indicating that three sets of bivariate pairs of predictor variables are moderately correlated. Participants who discuss academic and career issues with their peers also discuss socio-cultural issues with their peers ($r=.59$, $p < .01$). Participants who have course related interactions with faculty members have mentorship interactions with faculty as well ($r=.47$, $p < .01$). In addition, participants who perceived that their residence hall climate is academically supportive also perceive a socially supportive residence hall climate ($r=.68$, $p < .01$). It is not surprising that these pairs of predictor variables are correlated since they represented the

same general concepts; one pair represents peer interaction; the second pair represents interaction with faculty, and the third represents perception of residence hall climate. However, each variable in the pair measures a distinct aspect of the larger concept. Therefore, eliminating any of the variables to reduce the likelihood of multicollinearity would have result in the loss of potentially important information. As a result, all six of these predictor variables are included in the analyses.

In addition, participation in CSL programs is also highly correlated with discussing socio-cultural issues with peers (r=.89, p < .05). These findings are also not surprising since one of the primary aspects of the CSL program experience is interacting

Table 17

Bivariate Correlations Between Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Gender: Male	1.0												
2. Race: African American	-.48	1.0											
3. Race: Asian/Pacific Islander	.00	-.05	1.0										
4. Race: American Indian	-.03	-.01	-.02	1.0									
5. Race: Hispanic/Latino/a	.04	-.03	-.04	-.01	1.0								
6. Race: White	.01	-.41**	-.61**	-.12**	-.31**	1.0							
7. Race: Multi-racial	-.01	-.03	-.05	-.01	-.03	-.41**	1.0						
8. Race: Race Not Listed	.01	-.02	-.03	-.01	-.02	-.23**	-.02	1.0					
9. Involve: Fraternity/Sorority	.01	-.07	.02	-.02	-.02	.05	-.05	.00	1.0				
10. Involve: Varsity Sports	.03	.04	-.03	-.01	-.03	.02	-.04	.05	.07	1.0			
11. Involve: Work Study	-.06	.08	-.04	.04	.01	-.01	.01	-.06	-.09*	.01	1.0		
12. Involve: Community Service	-.09*	-.02	.06	.03	.06	-.03	-.04	-.02	.02	.01	.05	1.0	
13. Par. Ed: Associates or Less	-.08*	.11**	-.03	-.03	.14**	-.05	-.06	-.02	-.08	-.03	.04	.01	1.0
14. Par. Ed: Bachelors	.05	-.01	-.06	-.04	-.07	.11**	-.04	-.04	.12**	.05	.07	.06	-.37**
15. Par. Ed: Masters or More	.02	-.10*	.08*	.06	-.06	-.06	.09*	.05	-.04	-.03	-.10*	-.07	-.51**
16. Par. Income: Low Income	-.03	.05	.01	.02	-.02	-.02	.01	-.07	-.11**	-.03	.19**	.03	.33**
17. Par. Income: Middle Income	.05	-.00	-.06	-.04	.09*	.02	-.02	-.00	-.00	-.01	.07	.01	.01
18. Par. Income: High Income	-.02	-.05	.04	.01	-.07	-.01	.01	.07	.10**	.04	-.24**	-.03	-.31**
19. Pre-College Conf. in Cog. Skills	.10*	.04	-.07	-.01	.00	.03	-.02	.04	-.07	.03	.03	.06	-.02
20. High School Grades	-.08	-.02	.00	.01	.05	-.03	.03	.02	-.10*	.02	.01	.13**	.00
21. Discussed Acad. & Career w/Peers	-.08	-.06	-.07	-.01	-.02	.09*	.01	-.03	-.04	-.02	.02	.13**	-.08*
22. Discussed Socio-Cultural w/Peers	.03	-.06	-.05	.01	.01	.02	.06	.02	-.14**	-.05	.04	.10*	-.10*
23. Course Related Faculty Interaction	-.03	.07	.03	-.01	-.01	-.02	-.05	.00	.10**	.09*	.08*	.14**	-.02
24. Faculty Mentorship	.02	.02	-.00	.02	-.06	.01	.02	-.03	.04	.13**	.21**	.17**	-.11**
25. Res. Hall Academically Supportive	-.00	-.02	-.00	-.01	-.04	.08	-.09*	-.03	-.06	.05	.03	.08*	-.09*
26. Res. Hall Socially Supportive	-.01	-.03	-.01	.05	-.04	.04	-.04	.01	-.08	.03	.01	.05	-.06
27. LL Program: Residential Honors	.10*	-.09*	.09*	.00	.05	-.04	.00	.02	-.13**	-.05	-.08*	-.00	-.12**
28. LL Program: Civic/Social Lead.	.00	.04	-.09*	.04	.05	-.00	.02	.03	-.00	.02	.13**	.14**	.08*
29. LL Program: Non-Participation	-.11**	.06	-.02	-.04	-.10*	.05	-.02	-.04	.14**	.03	-.03	-.12**	.07
30. Critical Thinking Ability	.16**	-.06	-.02	.13**	.05	-.04	.06	.05	-.09*	-.10*	.04	.08*	-.15**

**p<.01, *p<.05

Table 17 (continued)

Bivariate Correlations Between Variables

Variable	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1.																	
2.																	
3.																	
4.																	
5.																	
6.																	
7.																	
8.																	
9.																	
10.																	
11.																	
12.																	
13.																	
14.	1.0																
15.	-.61**	1.0															
16.	-.01	-.28**	1.0														
17.	.04	-.04	-.42**	1.0													
18.	-.03	.30**	-.55**	-.53**	1.0												
19.	.03	-.01	-.02	.04	-.02	1.0											
20.	-.02	.02	-.01	.03	-.02	.10**	1.0										
21.	-.00	.08*	-.10*	.04	.06	.23**	.16**	1.0									
22.	-.03	.12**	-.02	-.02	.04	.25**	.08	.59**	1.0								
23.	.06	-.04	.03	-.02	-.01	.17**	.07	.24**	.16**	1.0							
24.	.03	.06	.01	.01	-.02	.10**	.07	.17**	.23**	.47**	1.0						
25.	-.04	.11**	-.07	.02	.05	.16**	.13**	.15**	.16**	.09*	.13**	1.0					
26.	-.04	.10*	-.04	.04	-.00	.16**	.12**	.21**	.26**	.06	.11**	.68**	1.0				
27.	-.07	.17**	-.12**	-.01	.12**	.17**	.35**	.24**	.25**	.03	.07	.25**	.24**	1.0			
28.	.00	-.07	.14**	.01	-.14**	.07	-.16**	.03	.89*	.02	.01	-.03	-.03	-.47**	1.0		
29.	.07	-.13**	.01	-.00	-.01	-.24**	-.24**	-.27**	-.34**	-.05	-.08*	-.25**	-.23**	-.67**	-.34**	1.0	
30.	.05	.09*	-.06	.04	.02	.33**	.04	.31**	.46**	.14**	.12**	.10*	.17**	.24**	.06	-.30**	1.0

**p<.01, *p<.05

with peers around civic and social issues. However, like the three other pairs of highly correlated predictors these two variables represent important data for this study and so they are included in the MLR analyses.

As part of the MLR analyses, variance inflation factors (VIF) are calculated for each independent variable. Any VIF of 10 or greater would demonstrate multicollinearity. However, none of the independent variables have VIF values equal to or greater than 10 so no variables are eliminated from the analyses due to multicollinearity.

Living-Learning Program Participation

The living-learning program participation of the participants in this study are correlated with several other predictor variables.

Inputs by L/L program.

RH program participants in this study are more likely to be male ($r=.10$, $p < .05$), while NPLL participants in this study are more likely to be female ($r=-.11$, $p < .01$). In addition, RH program participants are less likely to be African American ($r=-.09$, $p < .05$) and more likely to be Asian/Pacific Islander ($r=.09$, $p < .05$), while CSL participants are less likely to be Asian/Pacific Islander ($r=-.09$, $p < .01$). Students who do not participate in L/L programs are less likely to identify as Hispanic/Latino ($r=-.10$, $p < .05$). Parents' level of education and parents' income are also correlated with different types of L/L program participation. Residential Honors program participants are less likely to have parents who have only attained an Associates degree or less ($r=-.12$, $p < .01$), are less likely to be low income ($r=-12$, $p < .01$), more likely to have at least one parents who has attained a Masters or degree or higher ($r=.17$, $p < .01$), and more likely to be high income ($r=.17$, $p < .01$). Conversely, CSL program participants are more likely to have parents who have an Associates degree or less ($r=.08$, $p < .05$), more likely to be low income ($r=.14$, $p < .01$), and less likely to be high income ($r=-.14$, $p < .01$). Students who did not participate in any L/L programs are less likely to have a parent with at least a Masters degree ($r=-.13$, $p < .01$).

Pre-college confidence in cognitive skills, high school achievement, interaction with peers and faculty and perception of residence hall climate are also correlated with L/L program participation. Students who did not participate in L/L programs are less

likely to be confident in their pre-college cognitive skills (r=-.24, p < .01), while RH program participants are more likely to be confident in pre-college cognitive skills (r=.17, p < .01). Residential Honors participants are also more likely to report greater high school achievement (r=.35, p < .01), while CSL (r=-.16, p < .01) and NPLL students (r=-.24, p < .01) are more likely to report lesser high school achievement.

Environmental variables by L/L program.

Participation in L/L programs also differs across involvement in various campus experiences. Residential Honors participants are less likely to be part of a fraternity or sorority (r=-.13, p < .01), while NPLL students are more likely to belong to a Greek organization (r=.14, p < .01). In addition, RH participants are less likely to hold a work study position (r=-.08, p < .01), while CSL participants are more likely to have work study (r=.13, p < .01). Finally, CSL participants are more likely to participate in community service, and NPLL students are less likely to engage in community service activities (r=-.12, p < .01).

Residential Honors program participants are more likely to discuss academic and career issues (r=.24, p < .01), and socio-cultural issues (r=.24, p < .01) with peers, and as discussed earlier CSL participation is highly correlated with discussing socio-cultural issues with peers (r=.89, p < .05). Students who did not participate in any L/L programs are less likely to discuss academic and career issues (r=-.27, p < .01), and socio-cultural issues (r=-.34, p < .01) with peers, and are less likely to have mentoring relationships with faculty members (r=-.08, p < .05). Finally, RH program participants are more likely to perceive an academically (r=.25, p < .01) and socially (r=.24, p < .01) supportive residence hall climate, while NPLL students are more likely to perceive residence hall

climate that was unsupportive academically (r=-.25, p < .01) and socially (r=-.23, p < .01).

Self-Perceived Critical Thinking Ability

The correlation analyses also reveal some interesting relationships between predictor variables and self-perceived critical thinking ability. First, the correlations between input variables and self-perceived critical thinking ability are reported followed by the correlations between environmental variables and self-perceived critical thinking ability.

Inputs.

Men (r=.16, p < .01) are more likely to report greater critical thinking ability as are American Indian/Native Alaskans (r=.13, p < .01). In addition, study participants involved in greek organizations (r=-.09, p < .05) and varsity sports (r=-.10, p < .05) report lesser critical thinking ability, while participants involved in community service report greater critical thinking (r=.08, p < .05). In addition, study participants who have a parent who attained at least a Masters degree report greater critical thinking (r=.09, p < .05). Conversely, students whose parents have no more than an Associates degree report lesser critical thinking ability (r=-.15, p < .01). Finally, pre-college confidence in cognitive skills is positively correlated with self-perceived critical thinking ability (r=33, p < .01).

Environmental variables.

In addition, all variables representing peer and faculty interaction and residence hall climate are positively correlated with self-perceived critical thinking ability. The greater the frequency of study participants' discussions of academic, career (r=31, p <

.01) and socio-cultural (r=.46, p < .01) issues with peers, the greater their level of self-perceived critical thinking. The more course related (r=.14, p < .01) and mentorship(r=.12, p < .01) interactions with faculty study participants have, the higher their self-reported critical thinking. Finally, the more academically (r=.10, p < .05) and socially (r=.17, p < .01) supportive study participants perceive their residence hall climate to be the, higher their self-reported critical thinking.

Finally, and most importantly to this study, L/L program participation is significantly correlated with self-perceived critical thinking ability. Participants in RH programs report higher levels of critical thinking ability (r=.24, p < .01), while NPLL students report lower levels of critical thinking ability (r=-30, p < .01) and the relationship between CSL participation and self-perceived critical thinking is not significant (r=.06, p > .05). These findings are consistent with the hypothesis that the relationship between participation in RH programs and self-perceived critical thinking will be greater than the relationship between self-perceived critical thinking and participation in CSL programs and non-participation in an L/L Program. However, because examination of bivariate relationships does not isolate the variance in each variable accounted for by other variables, an accurate understanding of the relationship between each bivariate pair can not be attained from these analyses. As a result, further analyses that account for the variance in self-perceived critical thinking attributable to other variables are conducted in order to more fully understand the relationship between L/L program participation and self-perceived critical thinking ability.

Multiple Linear Regression Analyses

Multiple linear regression (MLR) analyses are used to answer the research question of this study. This type of analysis allowed for variables to be entered in blocks according to Astin's (1991) I-E-O model of student impact, so the incremental increase in the amount of the variance in the dependent variable can be assessed. The study follows the recommendations of Astin and Denson (2009) concerning entering variables when using ordinary least squares regression analyses to examine the impact of institutional level variables on student outcomes. They recommend entering first-year student input characteristics into the model first, followed by institutional characteristics, and then college experiences (Astin & Denson, 2009). The R^2 statistic is calculated to assess how much of the variance in critical thinking is accounted for by each model, and the R^2 change (ΔR^2), is calculated to assess how much more of the variance each model accounted for over and above the previous model.

While the data has a nested structure, multiple regression analysis is used to answer the research question instead of hierarchical linear modeling (HLM). Two conditions need to be met for using HLM; there should be at minimum 10 institutions with at least 30 cases from each institution, and the average outcome measure should vary substantially across institutions (Heck & Thomas, 2008). These conditions are not met in this study. There are only 8 institutions, two which have less than 30 cases. Moreover, the intraclass correlation coefficient (ICC) for self-reported critical thinking across the 8 institutions was .0098; an ICC substantially below the recommended .05 threshold (Heck & Thomas, 2008). This result means that over 99% of the variation in self-reported critical thinking takes place within an institution. Less than one percent of

the variation in self-reported critical thinking is accounted for by institutional characteristics.

Model Summary with L/L Program Entered Last

The variables are entered into the regression equation in blocks based on Astin's (1993) I-E-O model for studying student outcomes. Input characteristics such as gender, race/ethnicity, parents' income, parents' education, and high school achievement and pre-college confidence are entered in the first block. This model accounts for approximately 15% (R^2=.149) of the variance in self-perceived critical thinking (see Table 18). Environmental characteristics including involvement in Greek organizations,

Table 18

Contribution of Factors to Self-Perceived Critical Thinking Ability with L/L Program Entered Last

Blocks of Factors	Self-Perceived Critical Thinking Ability R^2	ΔR^2
1. Inputs	.149	
2. Institution and Involvement	.188	.039***
3. Interaction and Climate	.309	.120***
4. L/L Program Participation	.324	.016***
Final model R^2	.324	
F-test, *df*	11.591***, 25	

*** p<.001, **p<.01, *p<.05

work study, varsity sports and community service as well as institutional characteristics such as size, selectivity, investment in student service and location are entered in the second block. This Input-Environment model accounts for approximately 19% (R^2=.188) of the variance in self-perceived critical thinking, and of this 19%, environmental factors account for 4% (ΔR^2=.039) of the variance. The third block includes variables representing peer interaction, faculty interaction and residence hall climate. This Input-

Environment model explains 31% (R^2=.309) of the variance in self-perceived critical thinking, approximately 12% (ΔR^2=.120) is explained by the combined relationships among peer interaction, faculty interaction and residence hall climate.

Finally, the fourth block of the analysis includes variable representing L/L program participation. Residential Honors (RH) program participation is left out of the equation as the comparison group. The final model explains about 32% (R^2=.324) of the variance in self-perceived critical thinking, which is approximately 1% (ΔR^2=.016) more than the previous model. Because variables representing L/L program participation are the only variables entered in the fourth block, these findings show that L/L program participation alone explains a significant but very small portion of the variance in self-perceived critical thinking when all other variables in the analysis are taken into account. The results of the regression analysis are shown in Table 19.

Inputs as Predictors of Self-Perceived Critical Thinking Ability

Accounting for all other variables in the equation, three entry characteristics are found to be significant predictors of self-perceived critical thinking ability. Male participants demonstrate higher self-perceived critical thinking scores than female participants (β=.254, $p<.01$). These findings are consistent with the results from Li, Long and Simpson (1999) who found that men exhibit higher critical thinking ability than women; however, the magnitude of the difference in self-reported critical thinking from this study is small. Interestingly, previous research has concluded that men tend to have greater confidence in their cognitive skills than women, and as a result rate themselves higher on cognitive skill measures than women (Furnham & Fong, 2000; Pallier, 2003; Petrides & Furnham, 2000; Rammstedt & Rammsayer, 2000). Since the measure of

critical thinking in this study relies on the self reports of participants, it is possible that this finding is the result of differences in confidence in critical thinking skills between male and female participants rather than differences in their actual critical thinking skills. As a result, these findings should be considered carefully.

Table 19

Regression Model for Critical Thinking with L/L Program Entered Last

Variable	Inputs	Environ I: Institution and Involvement	Environ II: Interaction and Climate	Environ III: L/L Program
Male	.251***	.277***	.292***	.254**
Minority	.230	.205	.210	.195
Asian/Pacific Islander	.018	-.058	.020	-.025
Associates Degree or Less	-.299**	-.330**	-.269**	-.267**
Masters Degree or More	.052	.013	-.049	-.077
Low Income	-.037	-.067	-.084	-.087
High Income	-.070	-.053	-.066	-.079
High School Grades	.006	-.021	-.040	-.092
Pre-College Conf. in Cog. Skills	.310***	.308***	.209***	.195***
Selectivity		.211***	.122*	.138*
Size		-.147**	-.066	-.079
Investment in Student Services		-.045	-.016	-.010
Location: Midwest		.143	.077	.081
Involvement: Greek		-.183	-.085	-.054
Involvement: Varsity Sports		-.432*	-.400*	-.371*
Involvement: Work		.076	.055	.061
Involvement: Community Service		.177*	.093	.092
Peer Interaction: Academic			.053	.039
Peer Interaction: Socio-Cultural			.322***	.295***
Faculty Interaction: Course Related			.064	.071
Faculty Interaction: Mentorship			-.028	-.028
Residence Hall Climate: Academic			-.044	-.063
Residence Hall Climate: Social			.055	.046
L/L Program: Civic/Social Leadership				-.165
L/L Program: Non-Participation				-.333***
R^2	.149***	.188***	.309***	.324***
R^2 Change	.149***	.039***	.120***	.016***

*** p<.001, **p<.01, *p<.05

The results of this study do not support the findings of Gadzella, Masten and Huang (1999) and Flowers and Pascarella (2003) who found that White students demonstrated greater gains in critical thinking ability in college than African American students. The current study finds no significant differences in the self-perceived critical thinking of participants by race/ethnicity. However these results must be interpreted cautiously because, due to a lack of representation, African American, American Indian, Hispanic/Latino, Multi-Racial/Ethnic and study participants who reported their race was not listed are collapsed into one group, so any differences among these groups can not be assessed. On average, students whose parents have only attained an Associates degree or less have lower self-perceived critical thinking scores than the average student with at least one parent with a Bachelors degree (β=-.267, $p<.01$). The magnitude of this difference was small. Finally, pre-college confidence in cognitive skills is a significant positive predictor of self-perceived critical thinking ability (β=.195, $p<.001$).

Environmental Predictors of Self-Perceived Critical Thinking Ability

Institutional selectivity is the only institutional characteristic that is a significant predictor of self-perceived critical thinking ability when all other variables were taken into account (β=.138, $p<.05$). Institutional size is a significant negative predictor in the second model (β=-.147, $p<.01$), but is not significant once interaction, residence hall climate and L/L program participation are entered into the equation.

Likewise, involvement in community service is also a significant predictor in the second model (β=.177, $p<.05$), but is not significant once interaction, residence hall climate and L/L program participation are entered into the equation. Astin (1993) interprets such changes in significance or changes in the size of effects as evidence of

indirect effects. In this case, the interaction and climate variables entered in the next block completely explain the influences of institutional size and involvement in community service on self-perceived critical thinking ability. Therefore, institutional size and involvement in community service have indirect effects on self-perceived critical thinking ability associated with peer and faculty interaction and residence hall climate.

The only environmental variables other than L/L program participation that are significant predictors of self-perceived critical thinking ability when all other variables were taken into account are involvement in varsity sports and discussing socio-cultural issues with peers. On average, students who are involved in varsity sports show slightly lower levels of self-perceived critical thinking ability than the average student who is not involved in varsity sports (β=-.371, $p<.05$). Conversely, the more students engage in discussions of socio-cultural issues with their peers, the higher their self-perceived critical thinking ability (β=.295, $p<.001$).

Finally, the results partially support the hypothesis proposed in this study that the relationship between participation in RH programs and self-perceived critical thinking will be greater than the relationship between self-perceived critical thinking and participation in CSL programs and non-participation in an L/L Program. The results show that when all other variables are taken into account the average student who did not participate in an L/L Program had significantly lower self-perceived critical thinking ability than the average RH program student (β=-.333, $p<.001$). The magnitude of this significant effect was small to moderate.

Model Summary with Interaction and Climate Entered Last

Since the purpose of this study is to explore the relationship between L/L program participation and self-perceived critical thinking ability and to pose possible explanations for why a relationship might exist, a second multiple regression analysis is conducted to explore the relationship between self-perceived critical thinking and three important L/L program characteristics, peer and faculty interaction and residence hall climate (See table 20). In this analysis the variables are also entered in four blocks. The first two blocks were the same as the original regression analysis; however, the order of the last two blocks was switched with the L/L Program block entered third and the Interaction and Climate block entered into the equation last. Entering L/L program variables in the third block allowed for changes in the significance and effect size of the relationship of L/L program participation and self-perceived critical thinking ability to be assessed to determine if L/L program participation has an indirect effect associated with interaction and climate variables (Astin, 1993).

Table 20

Contribution of Factors to Self-Perceived Critical Thinking Ability with Interaction and Residence Hall Climate Entered Last

Blocks of Factors	Self-Perceived Critical Thinking Ability	
	R^2	ΔR^2
1. Inputs	.149	
2. Institution and Involvement	.188	.039***
3. L/L Program Participation	.232	.044***
4. Interaction and Climate	.324	.092***
Final model R^2	.324	
F-test, *df*	11.591***, 25	

*** p<.001, **p<.01, *p<.05

When L/L program participation is entered into the model without peer and faculty interaction and residence hall climate variables, the model explains 4% (ΔR^2=.040) of the variance in self-perceived critical thinking ability. This finding is in contrast to L/L program participation explaining 1.6% of the variance in self-perceived critical thinking ability (ΔR^2=.016) when interaction and residence hall climate variables have already been entered in a previous block of the analysis.

The difference between the average self-perceived critical thinking scores of RH program and NPLL students is significant and large (β=-.524, $p<.001$) with RH program participants reporting greater self-perceived critical thinking ability than NPLL students (see Table 21). A small difference in the self-perceived critical thinking scores of RH program and CSL program participants is also found (β=-.215, $p<.05$) with RH program participants reporting greater self-perceived critical thinking ability than CSL participants. However, when interaction and residence hall climate variables are entered into the model, the difference in self-perceived critical thinking between RH program participants and CSL program participants is no longer significant. Differences between RH program participants and NPLL students are still significant, but the effect size is reduced to small to moderate (β=-.310, $p<.001$).

The fact that the relationship between RH program participation and self-perceived critical thinking ability dissipates when interaction and residence hall climate variables are entered into the equation suggests that a portion of the value of RH program participation may be that it serves as a conduit to interaction with peers, interaction with faculty and residence hall climates that are academically and socially supportive. These results are consistent with Pike's (1999) findings that living in residence halls has an

Table 21

Regression Model for Critical Thinking with Interaction and Residence Hall Climate Entered Last

Variable	Inputs	Environ I: Institution and Involvement	Environ II: L/L Program	Environ III: Interaction and Climate
Male	.251***	.277***	.222**	.254**
Minority	.230	.205	.197	.195
Asian/Pacific Islander	.018	-.058	-.104	-.025
Associates Degree or Less	-.299**	-.330**	-.318**	-.267**
Masters Degree or More	.052	.013	-.051	-.077
Low Income	-.037	-.067	-.070	-.087
High Income	-.070	-.053	-.074	-.079
High School Grades	.006	-.021	-.084*	-.071
Pre-College Conf. in Cog. Skills	.310***	.308***	.265***	.195***
Selectivity		.211***	.223***	.138*
Size		-.147**	-.153**	-.079
Investment in Student Services		-.045	-.033	-.010
Location: Midwest		.143	.137	.081
Involvement: Greek		-.183	-.107	-.054
Involvement: Varsity Sports		-.432*	-.385*	-.371*
Involvement: Work		.076	.078	.061
Involvement: Community Service		.177*	.152	.092
L/L Program: Civic/Social Leadership			-.215*	-.165
L/L Program: Non-Participation			-.524***	-.333***
Peer Interaction: Academic				.039
Peer Interaction: Socio-Cultural				.295***
Faculty Interaction: Course Related				.071
Faculty Interaction: Mentorship				-.028
Residence Hall Climate: Academic				-.063
Residence Hall Climate: Social				.046
R^2	.149***	.188***	.232***	.324***
R^2 Change	.149***	.039***	.044***	.092***

*** p<.001, **p<.01, *p<.05

indirect effect on gains in intellectual skills associated with greater interaction between residents. Since L/L programs within the residence halls can improve the nature and frequency of peer and faculty interaction, the results suggest that the indirect effect of

living in college residence halls may be bolstered by participation in RH programs (Pike, Schroeder& Berry, 1997).

Summary

This chapter provided a review of the results of the statistical analyses implemented in this study. First, the demographic characteristics of the sample were discussed, followed by a discussion of the effect of missing data, an analyses of the bi-variate correlations between variables, and an analysis of mean differences in important L/L program characteristics among L/L programs. Then it was reported that the calculation of the intraclass correlation of self-perceived critical thinking ability reveals that less than 1% of the variance in self-perceived critical thinking is attributable to differences between institutions. Finally, this chapter concluded with a review of the results of the multiple regression analyses predicting self-perceived critical thinking ability. These results reveal that L/L program participation alone explains a significant but very small portion of the variance in self-perceived critical thinking when all other variables in the analysis are taken into account. However, they also reveal that L/L program participation has an indirect effect on self-perceived critical thinking ability associated with peer and faculty interaction and residence hall climate. The results show that L/L programs may serve as a conduit through which students are exposed to these important college experiences that are related to self-perceived critical thinking ability. The next chapter will include a discussion of the results, suggestions for future research as well as a discussion of the limitations of this study.

Chapter V

Discussion

This chapter begins with a brief description of the problem, the question guiding the study, the hypothesis and a review of the methodology. The findings are discussed in detail, examined in light of the literature, and conclusions are drawn. Next, the limitations of the study are discussed followed by suggestions for future research to further explore this topic. Finally, implications of the findings for practice and research are discussed.

Statement of the Problem

The purpose of this study is to explore the relationship between students' self-perceived critical thinking ability and participation in Residential Honors (RH) living-learning (L/L) programs versus self-perceived critical thinking ability and participation in Civic/Social Leadership (CSL) L/L programs, and self-perceived critical thinking ability and non-participation in (NPLL) L/L programs. The research question guiding this study is the following: What is the relationship between different types of inputs and environments and self-perceived critical thinking for students in Residential Honors (RH) programs, Civic/Social Leadership (CSL) programs and students not participating in L/L programs (NPLL)?

The literature concerning critical thinking shows that college experiences such as interacting with faculty and/or peers, being a member of smaller communities, increased involvement in college, greater collaboration among peers in and out of the classroom, and various co-curricular and curricular experiences are connected with the development

of critical thinking in students (Cabrera et al., 2002; Cruce, Woliniak, Seifert & Pascarella, 2006; Gellin 2003; Kuh, 1995; Pascarella, 1999; Pascarella et al., 1993; Tsui, 1999, 2001; Whitt, Edison, Pascarella, Nora & Terenzini, 1999). Pascarella and Terenzini (2005) found that L/L programs that include the experiences listed above have more positive effects on student outcomes than programs that do not include these experiences, or include them to a lesser degree.

Residential Honors and CSL programs include many of these experiences; however, it is important to note that not all RH are identical and not all CSL programs are identical. In general, RH programs emphasize classroom interaction with faculty and a rigorous curriculum more so than do CSL programs. CSL programs put more emphasis on experiential work in the field, which promotes collaboration, involvement and peer interaction, than do RH programs (Inkelas et al., 2004). In addition, students participating in these L/L programs are more exposed to the programmatic characteristics discussed above than are students who live in the residence halls, but do not participate in an L/L program (Inkelas et al., 2004). For example a review of the program level data obtained from the NSLLP reveals that while some CSL programs do not have a curricular component, some CSL programs in this study do include a curricular experience. However, based on the descriptions of RH and CSL programs provided by Inkelas and associates (2004), in general, RH programs provide experiences shown in the literature to contribute to critical thinking ability to a greater extent than do CSL programs. As a result, it is hypothesized that the relationship between participation in RH programs and self-perceived critical thinking will be greater than the relationship between self-

perceived critical thinking and participation in CSL programs and non-participation in any L/L Program.

Review of Methodology

The intraclass correlation coefficient for self-perceived critical thinking is calculated to determine if enough variance between institutions exists to warrant the use of Hierarchical Linear Modeling (HLM) versus Multiple Linear Regression (MLR) analysis. The intraclass correlation coefficient is .0098, far below the minimum threshold of .05 required for HLM analyses (Heck & Thomas, 2008). In addition, this study only includes data from 8 institutions, two less than the 10 institutions suggested as a minimum threshold for using HLM by the literature and two of the institutions have fewer than the minimum 30 cases required (Heck & Thomas, 2008). As a result, MLR analyses are used to examine the research question.

Variables are entered into the regression equation in blocks according to Astin's (1991) I-E-O model. Astin's model specifies that change is determined by comparing students input characteristics at their time of entry into the institution with their outcome characteristics after they have been exposed to the environment (Astin, 1993). Differences between inputs and outcomes are attributed to the impact of environmental characteristics over time (Astin, 1993). Variables are also entered in the equation in accordance with Astin and Denson's (2009) suggestions for multi-campus college impact studies. Student input characteristics are entered in the first block, the Inputs block, followed by involvement and institutional variables in the second block, the Involvement and Institution block, followed by peer and faculty interaction and residence hall climate variables in the third block, the Interaction and Climate block and finally, L/L program

participation variables were entered in the fourth and final block, the L/L Program block. Entering L/L program participation into the equation last allows for the contribution of L/L program participation over and above all other variables to be assessed.

Discussion of the Results

Profile of the Sample by Groups

Higher socioeconomic status students have disproportionately high access to RH program participation. Cross-tabulations analysis shows that high income and students with at least one parent with at least a Masters degree are over represented in RH programs and underrepresented in CSL programs. Students with at least one parent with at least a Masters degree are underrepresented in the group of students who do not participate in an L/L program. Conversely, low income students are overrepresented among CSL program participants, and underrepresented among RH program participants. Also, students whose parents attained at most an Associates degree are overrepresented in CSL programs and NPLL students, and underrepresented in RH programs.

Parental income and parental educational attainment have been used in previous studies to represent students' socioeconomic status (Astin, 1993). The higher income and educational attainment of RH program participants' parents indicate that they tend to have a higher socioeconomic status than participants in CSL programs and NPLL students. Differences in the socioeconomic status of program participants may be the result of different recruitment and selection criteria based on high school achievement.

Several previous studies find that socioeconomic status is strongly associated with academic achievement (Malecki & Demaray, 2006; Caldas & Bankston, 1997; Ma, 2000; Okpala, Smith, Jones & Ellis, 2000). In a meta-analysis of the literature on the

association of socioeconomic status and academic achievement published from 1999 to 2000, Sirin (2005) finds a moderate to strong relationship between socioeconomic status and students' high school academic achievement.

RH programs tend to require high minimum high school grades and standardized test scores, and CSL programs tend not to require minimum previous academic achievement levels for participation (Inkelas et al., 2004). As a result, RH program participants may have higher previous academic achievement than CSL and NPLL students. The results of the analysis of variance conducted in this study, which compares the high school grades of participants in this study by L/L program, support this assertion by revealing that on average RH program participants report higher high school grades than CSL program participants and NPLL students. Since Sirin (2005) finds that socioeconomic status is strongly associated with high school achievement, it is likely that the higher socioeconomic status of RH program participants is the result of RH programs' recruitment of students with high levels of academic achievement. This relationship is particularly important to this study because Astin (1993) found that peer group socioeconomic status has a positive association with critical thinking ability after controlling for other important inputs and environmental characteristics. As a result, RH program participants have an advantage in the development of critical thinking abilities over CSL program participants and NPLL students.

In addition, this study's examination of the results of the analysis of variance, concerning the mean differences in RH, CSL and NPLL students' scores on each of the six interaction and climate variables, provides some possible explanation of the importance of interaction and residence hall climate to the L/L program experience (see

table 14). The results support the idea that there are differences in levels of peer interaction and perception of residence hall climate between groups. For example, the results show that on average RH program participants engage in academic, career and socio-cultural discussions with their peers more often than NPLL students (see table 14). It is possible that RH programs recruit or attract students who are more likely to engage in these conversations, but it is also possible that RH programs, that emphasize "concentrated coursework in collaborative and creative endeavors," provide opportunities for these types of peer interactions to occur that are not available to students who lived in a residence hall but do not participate in an L/L program (Inkelas & Weisman, 2003, p. 336). In addition, RH program participants on average report that they experienced a more academically and socially supportive climate in their residence hall than CSL program and NPLL students. CSL program participants also reported experiencing a more academically and socially supportive climate than NPLL students. Since RH and CSL programs are residentially based, the residence hall environment is a significant aspect of the experience. In addition, unlike peer interaction, which could occur outside of the residence hall and the L/L program experience, the L/L program and residence hall experience of RH and CSL program participants are inextricably linked. Therefore differences between the self-perceived critical thinking ability of participants due to residence hall climate are tied to L/L program participation as well since differences in the residence hall climate may be due to the L/L program experience.

Between-College Influences on Self-Perceived Critical Thinking

One of the most important findings of this study is that over 99% of the variance in self-reported critical thinking ability is accounted for within institutions, and a trivial

amount, less than one percent, is explained by differences between institutions. This finding is consistent with Pascarella and Terenzini's (2005) comprehensive review of the literature that finds that across all student outcomes they examine, between-college differences have less of an effect on student developmental outcomes during college, such as critical thinking ability, than students' experiences during college or the net affect of attending versus not attending college. They do find between-college effects in the areas of career and economic attainment after college, but attributed those to status-allocating aspects of colleges, and the cues a degree from a particular institution communicates to employers (Pascarella & Terenzini, 2005). Though Pascarella and Terenzini do find between-college effects attributable to institutional characteristics, none of the institutional characteristics they studied had consistent effects across all student outcomes. Based on these findings they concluded that institutions of higher education are much more similar than they are different, and as a result most changes in student impact are attributable to within-college effects (Pascarella & Terenzini, 2005).

This finding also contributes to the on-going debate concerning the use of HLM versus OLS regression when studying college student impact with multi-institutional samples. Astin and Denson (2009) argue that investigators' recent calls for the use of HLM when conducting research with multi-institutional samples is unnecessary, and in some cases the use of OLS regression is superior. Because current HLM software programs do not allow for variables to be entered in blocks, variables cannot be entered in their assumed temporal sequence and the direct or indirect affects of variables cannot be assessed (Astin & Denson, 2009). Astin and Denson, further the argument that OLS regression was sufficient for college student impact studies by examining how 20 student

college-entering characteristics and 4 institutional characteristics affect students' self-reported political identification using both HLM and OLS regression. They find that both HLM and OLS regression models fit the data equally well, and both methods produce essentially the same results.

The results of the current study support Astin and Denson's (2009) assertion that OLS regression is sufficient and in some cases preferable to HLM when studying college student impact because of the important information provided by the ability to enter variables in blocks. Because current statistical software packages allow for variables to be entered sequentially in blocks in OLS analyses, but not in HLM analyses, the researcher using OLS can examine the direct and indirect effects of the independent variables on the dependent variable. Indirect effects are revealed when the significance or level of effect of an independent variable reduces when another independent variable is entered into the equation in a later block. The ability to assess direct and indirect effects is particularly important to this study since, as reported in the results section, one of the major findings is that L/L program participation has an indirect effect on self-perceived critical thinking ability associated with peer and faculty interaction and residence hall climate. Hierarchical Linear Modeling analyses would not have revealed this important finding because of the inability to assess indirect effects.

L/L Program Participation and Self-Perceived Critical Thinking

Students participating in RH programs report higher self-perceived critical thinking than students who live in the residence halls but do not participation in any L/L program. However, the results of the MLR analyses reveal that after taking all other variables into account, L/L program participation explains slightly more than one percent

of the variance in the self-perceived critical thinking of first-year students, which is a statistically significant but trivial contribution. Though this result is significant, it does not support the hypothesis of this study because the influence of L/L program participation is not large enough to be of practical importance.

These findings are consistent with the assessment of Dr. Karen Kurotsuchi Inkelas who stated that based on her analysis of the 2004 NSLLP data set, differences in critical thinking ability among L/L programs in the first-year are unlikely to be found (K.K. Inkelas, personal communication, 2009). In addition, though Inkelas et al. (2004) found that participants in Civic/Social Leadership Programs and Residential Honors Programs had higher critical thinking utilizations scores than participants in other types of L/L programs, the analyses that produced these results did not take other important variables into account, and included first-year through senior year students in the sample. Inkelas, Soldner, Longerbeam and Leonard (2008) also found a significant influence of L/L program participation on critical thinking ability, but unlike the present study, students from all four college class years were included in the sample.

It is interesting that the present study found a lack of a practically important contribution of L/L program participation to self-perceived critical thinking ability in the first-year of college, while other studies that included participants from all four college years found more substantive relationships between self-perceived critical thinking ability and L/L program participation. This contrast suggests that there may not be enough time during the first year of college for students' L/L program participation to influence their self-perceived critical thinking ability in a meaningful way. This leads one to believe that in order to capture a better understanding of the influence of L/L

program participation on self-perceived critical thinking ability, data on the self-perceived critical thinking ability of students should also be collected later in the college experience.

However, the results provide partial support of the hypothesis. When all other variables are taken into account, the self-perceived critical thinking scores of students who participated in RH programs on average are approximately .33 standard deviations higher than NPLL students (see Table 19). The difference in self-perceived critical thinking scores between RH participants and NPLL students is significant and moderate. This finding is consistent with previous research that found that students participating in RH programs report higher levels of critical thinking ability than students who do not participate in RH programs (Inkelas et al., 2004; Inkelas & Weisman, 2003; Seifert, Pascarella, Colangelo & Assouline, 2007).

The results also show that L/L program participation serves as a conduit for peer and faculty interaction and residence hall climate. Interestingly, when L/L program participation is entered into the equation before peer and faculty interaction and residence hall climate variables are taken into account, the L/L program block accounts for 4% of the variance in self-perceived critical thinking ability, 2.4% more than when the L/L program block is entered last. In addition, the self-perceived critical thinking scores of RH program participants were .52 standard deviations higher on average than students who lived in the residence halls but did not participate in an L/L program (see table 21). Once interaction and residence hall climate variables are entered into the equation, the difference in average self-perceived critical thinking scores between RH program

participants and students who did not participate in an L/L program reduces to .33 standard deviations.

According to Astin (1993), an indirect effect on the dependent variable is present when the addition of an independent variable into the regression equation results in the reduction of the significance and/or level of effect of another independent variable. In this case, the addition of peer and faculty interaction and residence hall climate variables mediates the effect of RH program participation reducing the effect size from moderate to small. This result reveals that a portion of the influence of RH program participation on self-perceived critical thinking ability is an indirect effect associated with peer and faculty interaction and residence hall climate.

The results did not support the hypothesis that the relationship between self-perceived critical thinking ability and RH program participation is greater than the relationship between CSL program participation and self-perceived critical thinking ability (see table 19). However, when L/L program participation is entered into the equation before peer and faculty interaction and residence hall climate variables are taken into account, the self-perceived critical thinking scores of RH program participants are .22 standard deviations higher on average than CSL program participants, a very small but significant difference (see table 21). Once interaction and residence hall climate variables are entered into the equation, the difference in average self-perceived critical thinking scores between RH program participants and CSL program participants is no longer significant. In this case, the influence of RH program participation was completely mediated by peer and faculty interaction and residence hall climate variables.

The results of the two multiple linear regression analyses (see tables 19 &21) show that the relationship between self-perceived critical thinking ability and L/L program participation decreases once interaction and residence hall climate variables are taken into account (see tables 19 and 21). This finding and the finding that peer and faculty interaction and residence hall climate account for 12% of the variance in self-perceived critical thinking demonstrate that these environmental variables are important aspects of the L/L program experience (see table 19).

However, taking these variables into account does not eliminate the effect size or the significance of the difference between the relationships of self-perceived critical thinking ability with RH program participation and with living in the residence halls, but not participating in an L/L program. This finding means that there are other aspects of RH programs in addition to peer and faculty interaction and residence hall climate that are associated with self-perceived critical thinking ability. These characteristics of RH programs are not captured in this study, so they can not be identified presently. However, future research should be conducted to examine the characteristics of RH programs to completely identify the aspects that contribute to the self-perceived critical thinking ability of RH program participants.

Limitations

This study is limited by a number of design issues. These limitations stem from the use of cross-sectional data to assess college impact, self-reported critical thinking ability rather than objective data from a standardized critical thinking test, the exclusion of program level data, and the inability to control for important variables that may

influence critical thinking ability. The limited number of institutions may also have masked the impact institutions have on self-reported critical thinking.

Cross Sectional Data

The NSLLP data set was collected at one point in time. In that period of time information about the dependent and independent variables was collected simultaneously (Mertens, 2005). Because the dependent variable, self-perceived critical thinking ability, could only be assessed at the time the NSLLP survey was conducted, no pre-college measure of critical thinking is available. Consequently, the cross-sectional nature of the data prevents the teasing out of changes in critical thinking attributable to the collegiate experience. To address this concern a composite created by Inkelas et al. (2004) based on students recollections of pre-college confidence in cognitive skills was used as a proxy for actual pre-college data. Pascarella (2001) asserts that though using longitudinal data is optimal for college impact studies, using a measure of students' pre-college openness to educational experiences can be used in place of actual pre-college data. By using a measure of students' pre-college confidence in their cognitive skills as a substitute for a pre-test measure of critical thinking, this study can reasonably account for the variance in critical thinking associated with pre-college critical thinking ability.

Pascarella (2001) also suggests that this technique is most powerful when using the same measure of the phenomenon of concern for retrospectively reporting pre-college openness to that phenomenon. However, while the composite representing current critical thinking ability and the composite representing pre-college confidence in cognitive skills share similar concepts and specific aspects of critical thinking such as analysis, inference, evaluation and disposition to critically think, they are composed of

different questions. Not using the same measure creates a less than optimal opportunity for comparison and as a result further limits the confidence in inferences that can be made about the connection between L/L program participation and self-perceived critical thinking ability.

Though caution must be exercised in evaluating the connection between L/L program participation and self-perceived critical thinking ability due to the design flaws previously discussed, the use of a retrospective variable representing pre-college critical thinking, even if not identical to the measure of current self-perceived critical thinking ability is better than the lack of a pre-college measure entirely (Pascarella, 2001). In addition, design flaws of this nature are acceptable because this study is exploratory in nature, and the findings are used to further understand the subject, not to assign cause and effect (Ray, 1993).

The results of this study contribute to a foundation on which other studies using longitudinal data can be based to more accurately assess the connection between L/L program participation and critical thinking ability. Efforts to study this relationship in the future will be possible since a second administration of the NSLLP survey was conducted in 2007 and another data collection is scheduled for 2010. Though the 2007 data are currently available they are not used as part of this study.

Self Reports

The data that compose the NSLLP student data set were collected through student self reports on an online survey instrument. The use of participants' self reporting of gains in skills, abilities, and learning has limited use in the assessment of individual participants gains compared to the use of objective standardized tests (Anaya, 1999;

Pascarella, 2001; Pike, 1995). Other studies that examine the development of critical thinking ability use standardized measures of critical thinking ability such as the California Critical Thinking Test or the Cornell Critical Thinking Test Levels X and Z (Ennis, 1993). Tests of these types use objective measures to assess induction, deduction, interpretation, argument analysis and many other factors (Ennis, 1993).

Though the objective assessments presented in the previous paragraph are valid, self-report assessments have been shown to also be valid particularly when the results are used to guide institutional or organizational policy decisions rather than to make specific assessments of an individual (Pascarella, 2001; Pike, 1995). Examinations by Pascarella (2001) and Pike (1995, 1996) demonstrate that though students self reports should not be used to replace standardized objective measures, self reported gains in critical thinking ability tend to correlate with the outcomes of standardized measures, and as a result, self-reported data can be used as general indicators of gains. In addition, when the costs in time and resources of purchasing and administering standardized objective tests of student outcomes are considered, the use of survey research to gather student self reported data is an attractive and acceptable alternative (Pascarella, 2001; Pike 1995).

Program Level Data

Another major limitation of this study is the exclusion of program level data. The NSLLP data set includes data on several important variables at the program level including faculty and staff roles, funding sources, and program admissions criteria. In addition, the exclusion of program level data eliminates the ability to deal with the lack of consistency among programs of the same type across institutions. The NSLLP data set includes definitions of RH and CSL programs, which include common characteristics of

each. However, these common characteristics are not universally included in all programs of like type in this study (see Table 2). For example, RH programs commonly have a curricular component and a focus on interaction with faculty, but not all RH programs include these characteristics. Similarly, while CSL programs commonly emphasize peer interaction and out of the classroom experiences, some also emphasize a curricular experience. However, because of missing and inaccurate data, these variables cannot confidently be used to represent program level characteristics. As a result, these important variables are excluded from this analysis, and the amount of variance in critical thinking they may account for is not assessed. However, analyses including these variables would be valuable to better understand the relationship of L/L program participation and critical thinking and should be used in future research.

Nested Data

The data from the NSLLP data set being used in this study were collected though successive sampling, which targeted institutions first and then of students nested within those institutions. However, Hierarchical linear modeling (HLM) could not be used to answer the research question, because the number of institutions available, the number of participants per institution, and the intraclass correlation are below the thresholds recommended in the literature (Heck & Thomas, 2008; Hox, 2002; Inkelas et al., 2004).

The inability to use HLM for this study was unfortunate because it limits the ability to fully assess the effects of institutional variables. From a theoretical perspective, Hierarchical Linear Modeling would have allowed the estimation of the contribution of both the student and the institution level variables in a simultaneous manner, eliminating errors created by aggregating or disaggregating the data (Umbach et al., 2005).

It is also important to note there is some disagreement about the usefulness of HLM in research on higher education. Recently, Astin and Denson (2009) conducted a comparison of HLM and ordinary least squares (OLS) regression analyses by using both techniques to analyze if students' political identification is affected by the political identification of peers and faculty members. The study specifically examines the relative fit of the models in each analysis and the extent to which different conclusions about the effects of institutional variables would be drawn based on the results from each technique.

Astin and Denson demonstrate that OLS analysis fit the data as well as the HLM analysis. However, they find that OLS analysis does increase the risk of rejecting the null hypothesis when it should be accepted for institutional variables, or committing a type I error. Based on these results, Astin and Denson (2009) conclude OLS may fit the data just as well as HLM, but the risk of type I errors should be reduced by requiring a p value for institutional level variables that is half the value being used for individual level variables. Moreover, Astin and Denson also note that because HLM does not allow for variables to be entered into the equation in blocks, potentially valuable information about the affect of variables is lost.

Though the use of OLS regression analyses in this study allowed for the discovery of important indirect effects due to the ability to enter variables in blocks, it would be also be valuable to analyze the data with HLM to assess if there would be a benefit to using this type of analysis. In order to do so the number of institutions and number of participants at certain institutions would need to be increased. The 2004 NSLLP data set would allow for the number of institutions to increase if institutions that only had one of

the L/L programs being examined in this study were allowed to be included. A decision was made in this study to only include institutions that had both programs on their campuses. Increasing the number of institutions involved in the study might also increase the variability at the institutional level. As a result, the criteria for conducting an HLM analysis could be met making HLM an appropriate analysis for this research question with these data.

Exclusion of Important Variables

Another limitation of this study is the inability to account for the influence of two important variables on the critical thinking ability of participants: college major and organizational behavior. Though the NSLLP data set does include information concerning the college or school the student belongs to, this information is not specific enough to glean the actual major. Consistent with Holland's (1997) theory of vocational choice, students who are predisposed to engage in critical thinking due to their skill set and personality will choose majors that enhance those skills. As a result, if either of the two L/L programs involved in this study attract students disproportionately from different majors the effect of major may confound the results.

Person-environment fit may also be a motivating factor in students' self selection into different L/L programs. Since students chose which L/L program to participate in, according to the theory of person-environment fit, it is likely that students chose an L/L environment that is congruent with their personality. As a result, L/L programs that emphasize critical thinking may attract students that are already predisposed to critically think, and any differences in the critical thinking of participants in different L/L programs

may be due entirely or in part to student self selection rather than the L/L program environment.

Berger and Milem (2000) propose that the organizational behavior of an institution may influence student outcomes. In reviewing the literature on organizational effectiveness, they found that institutions with a bureaucratic organizational behavior had a slight negative effect on cognitive-psychological student outcomes, which include critical thinking, and institutions with a systemic organizational behavior had positive effects on cognitive-psychological student outcomes (Berger & Milem, 2000). Their findings show that the organizational behavior of an institution may influence critical thinking ability and as a result should be taken into account when examining influences on critical thinking ability. Berger and Milem (2000) also suggest that organizational behavior can further influence student outcomes by affecting the composition of students peer group. Peer interaction has been shown to have significant effects on the development of critical thinking skills (Astin, 1993; Cruce, Wolniak, Seifert & Pascarella, 2006; Whitt, Edison, Pascarella, Nora & Terenzini, 1999). According to Berger and Milem (2000), students may self select in or out of an institution based on their experience of its organizational behavior. If, like academic major, students sharing a particular set of characteristics are more likely to select institutions with a particular type of organizational behavior over another, the experience of students with their peer groups may vary greatly between institutions.

Suggestions for Future Research

The purpose of this study is to explore the relationship of self-perceived critical thinking with participation in RH programs versus CSL programs and non-participation

in L/L programs. Inherent in the purpose of any exploratory study is also to lay the foundation on which research can be grounded. Based on the results of this study, suggestions can be made both for exploration of the subject matter as well as for improvements to study design.

Additional studies concerning the relationship of critical thinking and L/L program participation should be conducted to generate a more full understanding of the phenomena. Though the effect was moderate, the results showed that when all other variables were taken into account, RH program participants, on average, had significantly higher self-perceived critical thinking scores than NPLL students. These results show that participation in at least one type of L/L program is associated with self-perceived critical thinking ability. However, according to Inkelas and associates (2004) there are 11 other types of L/L programs that were not included in this study. As a result, future research concerning the association of critical thinking and L/L program participation should include other L/L program types in addition to RH and CSL programs so more full understanding can be obtained.

In addition, important variables that were not included in this study because they were unavailable in the data set should be included in future research. Variables that have been shown to be connected to critical thinking such as college major (Astin, 1993; Broadbear, Jin & Bierma, 2005; Gadzella & Masten, 1998; Lampert, 2007), perceived academic control (Stupnisky et al., 2008), as well as variables representing institutional type (Pascarella et al., 1996; Flowers & Pascarella, 1999) such as organizational behavior and control should be included in the model to improve the amount of variance in critical thinking that is accounted for by the full model.

In addition, valid program level data needs to be collected and included in the study to more fully understand differences between L/L program experiences. The variables included in this study do allow for preliminary exploration of the aspects of different types of L/L programs that may contribute to the relationship between participation and self-perceived critical thinking. However, a more full understanding of the aspects of L/L programs that contribute to critical thinking ability could be explored if detailed and accurate program level data are included such as budget allocation per student, faculty and staff to L/L program student ratio, and inclusion or exclusion of a curricular component and detailed description of the curricular experience.

In addition, future research exploring the connection between self-reported critical thinking and L/L program participation should consider using HLM to appropriately address the nestedness of data associated with studies involving multiple institutions. In so doing, future researchers should consider the fact that HLM does require a large number of institutions, each one with a large number of subjects. Studies using datasets suitable to the use of HLM could also help to illuminate the debate triggered by Astin and Denson (2009): is HLM the only avenue to conduct multi-campus studies of college impact.

The cross-sectional nature of the data restricts one's ability to examine causal connections related to L/L program participation and self-reported critical thinking. Future research should examine this study's research question using longitudinal data so that stronger conclusions can be drawn about the effect of L/L program experiences. In addition, ideally data would be collected at least at three points, prior to college, during the first year and during the third year. Baxter Magolda (1992) suggests that students'

development of critical thinking abilities progresses throughout college. Analyzing data collected at this three points in students' college careers would allow for the researcher to examine participants critical thinking ability before Baxter Magolda (1992) suggests a student is typically cognitively prepared to engage in critical thinking, when they are just beginning to engage in critical thinking and when they are developmentally ready to engage in critical thinking.

In addition, since peer and faculty interactions are important predictors of critical thinking ability and may mediate the influence of L/L program participation, future research should focus on these two variables. In particular, future research should include variables that provide a more detailed representation of peer and faculty interaction. For example, the variables representing peer and faculty interaction in this study do not delineate between those interactions that are part of the L/L program experience from interactions that are not part of the L/L program experience. By including variables that capture peer and faculty interaction as part of the L/L program experience, and variables that capture peer and faculty interaction that is not part of the L/L program experience, future research would be able to draw comparisons between the relationship of critical thinking ability and each kind of peer or faculty interaction.

In addition, Allport (1954) proposed a Contact Theory that states that not all contact is the same, and that the nature of contacts or interactions between people is important. Though Allport's (1954) work was in the context of interactions between members of different racial/ethnic backgrounds, the basic theme that the nature of interaction is important is germane to a number of different contexts including peer and faculty interactions. In accordance with Allport's theory, future research should include

variables that better represent the nature of student contact with peers and faculty in addition to the frequency of contact. For example, including variables that represent whether or not the participants' interactions with peers or faculty were positive or negative would allow for conclusions to be drawn about differences in the critical thinking ability of students who had positive interactions with peers and faculty compared to those who report their interactions with peers and faculty were negative.

The results of this study also indicate that at least a portion of the relationship of L/L program participation to self-perceived critical thinking ability is associated with peer and faculty interaction and residence hall climate. This finding reveals that L/L programs may serve as a conduit for these three college environmental variables that accounted for the a greater amount of variance in self-perceived critical thinking ability than any other block of variables in this study. Future research on L/L programs should include peer and faculty interaction and residence hall climate variables in such a way that the indirect effects of L/L program participation associated with these variables can be further explored.

Finally, the measure of critical thinking used in this study is a composite comprised of six questions that asked students to self-report their critical thinking behaviors. Pascarella (2001) asserts that the use of self-reported measures of student outcomes, such as critical thinking, is acceptable when being used to guide policy or research. However, standardized measures of student outcomes should be used whenever possible (Pascarella, 2001). Though it is not possible to include a standardized measure of critical thinking ability in this study because the data used were from a pre-existing data set, future studies should employ standardized measures of critical thinking so a

more accurate assessment of the outcome variable can be attained, and the results can be interpreted with greater confidence.

Implications of Findings

The findings of this study demonstrate the role of L/L program participation in the development of critical thinking ability, and provide some insight into the aspects of L/L programs that make this possible. This study provides some cues for how institutions of higher education should structure their L/L program experiences, how to assess the effectiveness of L/L programs and how to enhance the critical thinking of their students. Finally, this study also identifies the inequities that may be perpetuated by recruitment and selection criteria that are linked to socioeconomic class. However, because this study is exploratory, further examination of this topic is necessary before major policy decisions are based on this information.

The results of the study show that on average RH program participants had higher self-perceived critical thinking scores than participants that did not participate in L/L programs. This finding is important for two reasons, first it shows that L/L program participation is related to self-perceived critical thinking, second it allows for a deeper understanding of the development of critical thinking ability to be explored through examining which aspects of RH programs contribute to their relationship to self-perceived critical thinking.

Because participation in RH programs is related to self-perceived critical thinking more so than just living in a residence hall, but not participating in an L/L program, colleges and universities have an additional tool for helping to develop the critical thinking of their students. Research, employers, higher education associations and US

presidents have called for institutions of higher education to enhance the critical thinking of college students (ACPA, 2007; Astin, 1993; Halpern, 1998; Hunt, 1995; Jones et al., 1995; NACE, 2007; National Goals Panel, 2008; Pithers & Solden, 2000; Stupnisky et al., 2007). To achieve this goal colleges and universities have changed curricular and classroom practices (Cabrera, Nora, Crissman, Terenzini, Bernal& Pascarella, 2002; Doyle, Edison & Pascarella; Tsui, 1999, 2001), emphasized faculty and peer interaction (Cruce, Woliniak, Seifert & Pascarella, 2006; Kuh, 1995; Whitt, Edison, Pascarella, Nora & Terenzini, 1999), and made efforts to increase student involvement in college (Gellin, 2003; Kuh et al., 1991; Pascarella, Bohr, Nora, Zusman, Inman & Desler, 1993; Schroeder, 1994). Due to the results of this study, participation in RH programs and by extension, L/L programs that share similar characteristics, may be added to the list of college experiences that assist in the achievement of this goal.

However, not all L/L programs are equal in their relationship to self-perceived critical thinking, and have many different forms and focuses (Inkelas, 2004). In this study, the difference in the relationships of self-perceived critical thinking ability and RH program participation versus CSL program participation was not significant when all variables were taken into account. However, prior to peer and faculty interaction and residence hall climate variable being added into the equation, the difference is significant, but small. The analysis of mean differences among groups shows that while mean differences between RH and CSL program participants' scores on peer and faculty interaction were not significant, they did experience significantly different residence hall climates with RH program participants finding their residence hall climate to be more academically and socially supportive. These results show that different L/L programs

provide different experiences and those experiences may result in different levels of association with critical thinking.

The results of this study indicate that for first-year students, peer interaction, faculty interaction and residence hall climate are related to self-perceived critical thinking ability. Though only peer interactions involving discussions of socio-cultural issues was significant on its own, the Interactions and Climate block containing these variables accounted for 12% of the variance in self-perceived critical thinking ability. Living-learning programs, such as RH programs, can be used to enhance these important experiences. This idea is supported by the finding based on the results of the analysis of variance that on average RH program participants indicated that they had more discussions about academic, careers and socio-cultural issues with peers and experienced a more academically and socially supportive residence hall environment than students who did not participate in L/L programs.

However, because these results are based on students' self-reports, it is possible that the higher scores for self-perceived critical thinking of RH program participants are the result of heightened awareness of critical thinking due to greater opportunities to practice critical thinking skills with peers and faculty in a positive environment. Pascarella (2001) asserts that students' self-reports may differ because they differently perceive the impact of certain experiences. In accordance with Pascarella's (2001) assertion, differences in self-reported critical thinking among RH program, CSL program and NPLL student groups may be due to RH program participants' greater awareness of their critical thinking. Though this analysis does not account for issues associated with students' self reports and does not control for other important variables, it provides

helpful context for the exploration of the impact of peer and faculty interaction and residence hall climate on self-perceived critical thinking ability.

The results of the MLR analyses reveal that faculty interaction is not a significant predictor of self-perceived critical thinking ability and no mean differences in level of faculty interaction between groups are found based on the analysis of variance. However, institutions of higher education should not neglect the importance of student and faculty interaction. It is possible that the first-year student participants in this study are not developmentally ready to fully exploit opportunities for faculty interaction that might result in the development of critical thinking abilities (Baxter Magolda, 1992). However, the progression of cognitive development of students relies on opportunities for students to have new experiences, practice new skills, and be challenged (Chickering & Reisser, 1993). Since faculty interaction is shown in the literature to be an important contributor to the development of critical thinking ability, institutions of higher education should continue to value faculty interaction as part of the L/L program experience even though the results of this study do not show its importance (Cruce, Woliniak, Seifert & Pascarella, 2006; Kuh, 1995; Whitt, Edison, Pascarella, Nora & Terenzini, 1999). Based on this idea and the findings of this study, institutions of higher education should seek to create L/L programs that emphasize peer and faculty interaction and an academically and socially supportive residence hall environment.

Though the findings of this study present RH programs as a possible tool for the enhancement of students' critical thinking ability, they also reveal the significant problem that RH programs may perpetuate and enhance social inequities. Because most RH programs have recruitment and selection criteria, such as high achievement in high

school and high standardized test scores, many students are excluded from the RH program experience. This issue is particularly troubling since socioeconomic status has been linked in the literature to academic achievement and performance on standardized tests (Malecki & Demaray, 2006; Caldas & Bankston, 1997; Ma, 2000; Okpala, Smith, Jones & Ellis, 2000; Sirin, 2005). This relationship is supported by the results of this study that students in the high income group and students who have at least one parent with a Masters degree are over represented among RH program participants. As a result, students who are already advantaged by their higher socioeconomic status have access to RH programs, while students of lower socioeconomic status do not.

In addition, the results also show that males are overrepresented among RH program participants, and participants in L/L programs are overwhelmingly White while there is comparatively little representation of students of color. Like higher socioeconomic status students, males and White students are participating in RH programs at disproportionately higher rates than females and students of color. Because RH program participation is associated with self-perceived critical thinking, male and White students have an additional advantage over females and students of color that may perpetuate and enhance already existing social inequities.

Colleges and universities should take steps to mediate inequities associated with these programs. Institutions could choose to eliminate high school achievement and standardized test score requirements that may disproportionately advantage students of higher socioeconomic status. However, since RH programs are often used as a tool to recruit elite students to attend the institution is it unlikely that colleges and universities will choose to remove these requirements. An alternative is that institutions could

provide all students with access to those aspects of RH programs, peer and faculty interaction and residence hall climates, that are associated with self-perceived critical thinking ability through partnerships between the faculty and student affairs divisions. In particular, residence life departments should structure their residential experiences to expose all students to these important aspects of the college environment.

In addition, because RH programs appear to be racially/ethnically homogeneous, students who participate in these programs may have limited opportunities to interact with members of other race/ethnicities. As a result, RH program participants may be disadvantaged in more racially/ethnically diverse environments, such as a diverse work place, because they have not had the opportunity to learn how to interact with members of other cultures. Aside from attempting to recruit a more heterogeneous population of students for these programs to increase the opportunity of interracial interaction among students, program administrators should structure experiences that foster interaction across campus. Also, it should be noted that this study only captured students who participated in RH programs. In some cases, RH programs are subpopulations of larger Honors programs that also include non-residents. If the representation of students of color is greater among non-residents, interaction among all Honors program participants may also be a way to increase interracial interaction. In addition, a racially/ethnically diverse group of program faculty and administrators who can facilitate the integration of multicultural concepts throughout the RH program experience is important for RH program participants' greater understanding of other cultures.

Finally, this study supports the assertion from previous research that institutions of higher education should do more to collect and analyze data concerning their L/L

programs. A significant limitation of this study was that reliable program level data was not available. There was an attempt made during the NSLLP data collection to collect program level data from program administrators, however some data was unavailable and some data that was provided was found to be inaccurate (K.K. Inkelas, personal communication, 2007). As a result, important specific information about the experiences provided by different programs and the level of resources dedicated to support those experiences was not included in this study. These data could have added to the richness of this study and provided more insight into what aspects of L/L programs may contribute to participants' self-perceived critical thinking ability.

Though some program administrators provided accurate information it is surprising that many could not provide this information accurately. Since these basic elements of data would be integral to an assessment of the value and effectiveness of L/L programs, the fact that these data are not readily available to many program administrators gives the appearance that few institutions are engaged in assessment of their L/L programs. The apparent lack of L/L program assessment by institutions of higher education is unfortunate and as a result many questions about the effectiveness of L/L programs in contributing to the important student outcomes, like the development of critical thinking ability, go unanswered. Therefore, institutions of higher education must engage in the assessment of L/L programs and the collection of data to support these assessments to be able justify the allocation of resources to these programs, provide the most effective L/L program experiences, and to add to larger multi-institutional data sets like the NSLLP.

Appendix A

Living Learning

National Study of Living-Learning Programs (NSLLP)

2004 Residence Environment Survey

Please note:

Because this survey was fielded on the World Wide Web, the questions on this paper-and-pencil version of the questionnaire were altered in format to conform to the layout parameters of a Web survey. (For example, the questions that appeared on the actual Web survey did not spill over to the next column or page.) However, the content and order of the questions were the exact same as this version.

Your Perceptions Before Enrolling in College

1. Thinking back to *before you started college*, what activities did you *think* were going to be very important to you during college? (Circle one response for each.)

1 = Not at all important 3 = Important
2 = Somewhat important 4 = Very important

Participating in extra-curricular activities	1	2	3	4
Participating in volunteer or community service activities	1	2	3	4
Getting to know people from backgrounds different than your own	1	2	3	4
Learning about cultures different from your own	1	2	3	4
Discussing ideas and intellectual topics with other students	1	2	3	4
Getting to know your professors outside of class	1	2	3	4
Learning more about yourself	1	2	3	4
Finding your residence hall to be academically supportive	1	2	3	4
Finding your residence hall to be socially supportive	1	2	3	4
Drinking alcohol during social occasions	1	2	3	4

2. Looking back to *before you started college*, how confident were you that you would be successful at the following: (Circle one response for each.)

1 = Not at all confident 3 = Confident
2 = Somewhat confident 4 = Very confident

Handling the challenge of college-level work	1	2	3	4
Feeling as though you belong on campus	1	2	3	4
Analyzing new ideas and concepts	1	2	3	4
Applying something learned in class to the "real world"	1	2	3	4
Enjoying the challenge of learning new material	1	2	3	4
Appreciating new and different ideas, beliefs	1	2	3	4
Developing your own values and beliefs	1	2	3	4
Gaining skills in working with others	1	2	3	4
Growing and developing academically	1	2	3	4
Making a difference in the community in which you live	1	2	3	4
Being satisfied with your college experience	1	2	3	4

Your Experiences in College

3. Using a continuum of 1 = Very difficult to 6 = Very easy, please indicate how you felt the following activities to be during your first year in college. (Circle one response for each.)

	Very Difficult					Very Easy
Amount or difficulty of coursework	1	2	3	4	5	6
Using computers for coursework	1	2	3	4	5	6
Seeking academic or personal help when you needed it	1	2	3	4	5	6
Becoming familiar with the campus	1	2	3	4	5	6
Learning to use e-mail	1	2	3	4	5	6
Making new friends	1	2	3	4	5	6
Managing your time effectively	1	2	3	4	5	6
Managing money effectively	1	2	3	4	5	6
Communicating with instructors outside of class	1	2	3	4	5	6
Being separated from your family	1	2	3	4	5	6
Forming study groups	1	2	3	4	5	6
Getting along with your roommate(s)	1	2	3	4	5	6
Getting to know other people in your residence hall	1	2	3	4	5	6

4. During the past year, how much time did you spend during a typical week doing the following activities? (Circle one response for each.)

	None	1 to 5 hrs	6 to 10 hrs	11 to 15 hrs	16 to 20 hrs	21+ hrs
Attending classes	1	2	3	4	5	6
Studying/doing homework	1	2	3	4	5	6
Socializing with friends	1	2	3	4	5	6
Exercising/sports	1	2	3	4	5	6
Partying	1	2	3	4	5	6
Working (for pay)	1	2	3	4	5	6
Volunteer work	1	2	3	4	5	6
Student clubs/groups	1	2	3	4	5	6
Watching TV alone	1	2	3	4	5	6
E-mail or instant messaging	1	2	3	4	5	6
Playing video/computer games	1	2	3	4	5	6

5. During the past year, how involved are/were you in any of the following activities? (Circle one response for each.)

1 = Not at all involved **3 = Involved**
2 = Somewhat involved **4 = Very involved**

a. Fraternity/sorority	1	2	3	4
b. Service fraternity/sorority	1	2	3	4
c. Marching band	1	2	3	4
d. Arts/music performances & activities	1	2	3	4
e. Intramural or club sports	1	2	3	4
f. Varsity sports	1	2	3	4
g. Student government	1	2	3	4
h. Political or social activism	1	2	3	4
i. Religious clubs and activities	1	2	3	4
j. Ethnic/cross-cultural activities, clubs	1	2	3	4
k. Media activities (e.g., newspaper, radio)	1	2	3	4
l. Work-study or work on-campus	1	2	3	4
m. Work off-campus	1	2	3	4
n. Armed Services ROTC	1	2	3	4
o. One-time community service activity	1	2	3	4
p. Ongoing community service activity	1	2	3	4
q. Other (specify: _____)	1	2	3	4

6. Who did you primarily socialize with during the *current* school year? (Circle all that apply.)

1. People you work with
2. People in social clubs/activities
3. People you attend class with
4. People in your major or intended major
5. People in a living-learning (L/L) program
6. People in your residence hall (not in L/L program)
7. Friends from home
8. Other: _____

7. During interactions with other students outside of class, how often have you done each of the following during the *current* school year? (Circle one response for each.)

1 = Never **3 = A few times a month**
2 = A few times a semester **4 = Once or more a week**

Discussed something learned in class	1	2	3	4
Talked about current news events	1	2	3	4
Talked about different lifestyles/customs	1	2	3	4
Shared your concerns about classes and assignments	1	2	3	4
Held discussions with students whose personal values were very different from your own	1	2	3	4
Discussed major social issues such as peace, human rights, and justice	1	2	3	4
Talked about your future plans and career ambitions	1	2	3	4
Held discussions with students whose religious beliefs were very different from your own	1	2	3	4
Discussed your views about multiculturalism and diversity	1	2	3	4
Studied in groups	1	2	3	4
Held discussions with students whose political opinions were very different from your own	1	2	3	4

8. About how often have you done each of the following during the *current* school year? (Circle one for each.)

1 = Never **3 = A few times a month**
2 = Once to a few times a semester **4 = Once or more a week**

Asked your instructor for information related to a course you were taking	1	2	3	4
Visited informally with an instructor before or after class	1	2	3	4
Made an appointment to meet with an instructor in his/her office	1	2	3	4
Communicated with your instructor using e-mail	1	2	3	4
Visited informally with an instructor during a social occasion (e.g., over coffee or lunch)	1	2	3	4
Discussed your career plans and ambitions with an instructor	1	2	3	4
Discussed personal problems or concerns with an instructor	1	2	3	4
Went to a cultural event (e.g., concert or play) with an instructor or class	1	2	3	4
Worked with an instructor on an independent project	1	2	3	4
Worked with an instructor involving his/her research	1	2	3	4

9. Please indicate the level to which you agree with the following statements. (Circle one response for each.)

1 = Strongly disagree **3 = Agree**
2 = Disagree **4 = Strongly agree**

I frequently question or challenge professors' statements and ideas before I accept them as "right"	1	2	3	4
I prefer courses in which the material helps me understand something about myself	1	2	3	4
I prefer courses requiring me to organize and interpret ideas over courses that ask me only to remember facts or information	1	2	3	4
There have been times when I have disagreed with the author of a book or article that I was reading	1	2	3	4
I consider the best teachers to be those who can tie things learned in class to things that are important to me in my personal life	1	2	3	4

9. (continued)

I enjoy discussing issues with people who don't agree with me	1	2	3	4
I try to explore the meaning and interpretations of the facts when I am introduced to a new idea	1	2	3	4
A good way to develop my own opinions is to critically analyze the strengths and limitations of different points of view	1	2	3	4
I have become excited about a specific field or academic major as a result of taking a course in that field	1	2	3	4
When I discover new ways of understanding things, I feel even more motivated to learn	1	2	3	4
When I don't understand something in a course, I work at it until I do	1	2	3	4
Something I learned in one class helped me understand something from another class	1	2	3	4
I try to look at everybody's side of a disagreement before I make a decision	1	2	3	4
I enjoy the challenge of learning complicated new material	1	2	3	4
I prefer reading things that are relevant to my personal experiences	1	2	3	4
I often have discussions with other students about ideas or concepts presented in classes	1	2	3	4
Learning is important to me because it will give me greater control over my life	1	2	3	4
For me, one of the most important benefits of a college education is a better understanding of myself and my values	1	2	3	4
I enjoy courses that are intellectually challenging	1	2	3	4
I have applied material learned in a class to other areas in my life, such as in my job, internship, interactions with others	1	2	3	4

10. In thinking about how you have changed during college, to what extent do you feel you have grown in the following areas? (Circle one response for each.)

1 = Not grown at all 3 = Grown
2 = Grown somewhat 4 = Very much grown

Becoming more aware of different philosophies, lifestyles, and cultures	1	2	3	4
Developing your own values and ethical standards	1	2	3	4
Understanding yourself and your abilities, interests, and personality	1	2	3	4
Improving your ability to get along with people different than yourself	1	2	3	4
Ability to put ideas together and to see relationships between ideas	1	2	3	4
Ability to learn on your own, pursue ideas, and find information you need	1	2	3	4
Appreciation of racial/ethnic differences	1	2	3	4
Ability to critically analyze ideas and information	1	2	3	4
Learning more about things that are new to you	1	2	3	4
Appreciation of art, music, and drama	1	2	3	4
Gaining a broad general education about different fields of knowledge	1	2	3	4
Openness to views that you oppose	1	2	3	4
Ability to discuss controversial issues	1	2	3	4
Motivation to further explore ideas presented in class	1	2	3	4

11. Now that you have been in college for a while, how confident do you feel in the following areas? (Circle one response for each.)

1 = Not at all confident 3 = Confident
2 = Somewhat confident 4 = Very confident

Writing ability	1	2	3	4
Math ability	1	2	3	4
Working independently	1	2	3	4
Research ability	1	2	3	4
Computer ability	1	2	3	4
Problem-solving ability	1	2	3	4
Library skills	1	2	3	4
Expressing ideas orally	1	2	3	4
Working as part of a team	1	2	3	4
Time management skills	1	2	3	4
Leadership ability	1	2	3	4

YOUR RESIDENCE HALL ENVIRONMENT

12. How often do you utilize the following resources or participate in the following activities *inside your residence hall*? (Circle one response for each.)

1 = Never 3 = A few times a month
2 = A few times a semester 4 = Once or more a week
9 = Not available in my residence hall

(Utilized in your residence hall…)

Computer labs	1	2	3	4	9
Academic advisors	1	2	3	4	9
Peer counselors	1	2	3	4	9
Interactions with professors	1	2	3	4	9
Seminars and lectures	1	2	3	4	9
Peer study groups	1	2	3	4	9
Social activities	1	2	3	4	9
Career workshops	1	2	3	4	9
Community service projects	1	2	3	4	9

13. Consider how well each of the following statements describes your residence hall environment. (Circle one response for each.)

1 = Strongly disagree 3 = Agree
2 = Disagree 4 = Strongly agree

I can find adequate quiet study space available in my residence environment	1	2	3	4
I find that students in my residence environment have an appreciation for people from different races or ethnic groups	1	2	3	4
Students in my residence environment are concerned with helping and supporting one another	1	2	3	4
Life in my residence environment is intellectually stimulating	1	2	3	4
I find that students in my residence environment have an appreciation for people with different sexual orientations	1	2	3	4
I would recommend this residence environment to a friend	1	2	3	4

13. (continued)

I find that students in my residence environment have an appreciation for people from different religions	1	2	3	4
I see students with different backgrounds having a lot of interaction with one another in my residence environment	1	2	3	4
I have enough peer support in my residence environment to do well academically	1	2	3	4
Most students in my residence environment study a lot	1	2	3	4
I think the majority of students in my residence environment think academic success is important	1	2	3	4
My residence environment clearly supports my academic achievement	1	2	3	4
I think the staff in my residence environment spend a great deal of time helping students succeed academically	1	2	3	4
I think it's easy for students to form study groups in my residence environment	1	2	3	4

PERCEPTIONS OF DIVERSITY

14. To what extent have you done the following with *students from a racial/ethnic group that is different from your own*? (Circle one response for each.)

1 = Not at all **3 = A lot**
2 = A little **4 = All of the time**

Studied together	1	2	3	4
Shared a meal together	1	2	3	4
Were roommates	1	2	3	4
Attended social events together	1	2	3	4
Had intellectual discussions out of class	1	2	3	4
Dated someone	1	2	3	4
Shared personal feelings and problems	1	2	3	4
Participated in extracurricular activities together (e.g., clubs)	1	2	3	4
Had meaningful discussions about race relations outside of class	1	2	3	4
Had guarded, cautious interactions	1	2	3	4
Had tense, or even hostile interactions	1	2	3	4

15. Please rate the extent to which each of the following is descriptive of your college campus. (Circle one response for each.)

1 = Little or none **3 = Quite a bit**
2 = Some **4 = A great deal**

Respect by white professors for students of color	1	2	3	4
Dating between students of color and white students on campus	1	2	3	4
Inter-racial tension in the residence halls	1	2	3	4
Friendship between students of color and white students	1	2	3	4
Campus commitment to develop an environment that is conducive to the success of students of color	1	2	3	4
Separation among students from different racial/ethnic backgrounds on campus	1	2	3	4
Trust and respect between students from different racial/ethnic backgrounds	1	2	3	4
Interaction between students of color and white students	1	2	3	4
Racial conflict on campus	1	2	3	4

16. Please indicate the extent to which you agree or disagree with the following statements. (Circle one response for each.)

1 = Strongly disagree **3 = Agree**
2 = Disagree **4 = Strongly agree**
9 = Don't know/Never thought about this

Since coming to college, I have learned a great deal about other racial/ethnic groups	1	2	3	4	9
I have gained a greater commitment to my racial/ethnic identity since coming to college	1	2	3	4	9
My campus's commitment to diversity fosters more division among racial/ethnic groups than intergroup understanding	1	2	3	4	9
Since coming to college, I have become aware of the complexities of inter-group understanding	1	2	3	4	9
My relationships with students from different racial/ethnic backgrounds during college have been positive	1	2	3	4	9

16. (continued)

I think this campus's focus on diversity puts too much emphasis on the differences between racial/ethnic groups	1	2	3	4	9
My social interactions on this campus are largely confined to students of my race/ethnicity	1	2	3	4	9
At times, it is important to be with people of my own racial/ethnic group for the chance to be myself	1	2	3	4	9

CITIZENSHIP PERCEPTIONS

17. Please indicate your agreement or disagreement with the following items. (Circle one response for each.)

1 = Strongly disagree **2 = Disagree** **3 = Neutral** **4 = Agree** **5 = Strongly agree**

For the items that refer to a "community," please refer to the community to which you feel the most affiliated, whatever that may be.

I understand the extent to which the groups I participate in contribute to the larger community	1	2	3	4	5
It is important to me that I play an active role in my communities	1	2	3	4	5
I volunteer my time to the community	1	2	3	4	5
I believe my work has a greater purpose for the larger community	1	2	3	4	5
There is little I can do that makes a difference for others	1	2	3	4	5
I believe I have responsibilities to my community	1	2	3	4	5
I give time to making a difference for someone else	1	2	3	4	5
Ordinary people can make a difference in their community	1	2	3	4	5
I work with others to make my communities better places	1	2	3	4	5
I have the power to make a difference in my community	1	2	3	4	5
I am willing to act for the rights of others	1	2	3	4	5
I participate in activities that contribute to the common good	1	2	3	4	5
I believe I have a civic responsibility to the greater public	1	2	3	4	5
I value opportunities that allow me to contribute to my community	1	2	3	4	5

EXPERIENCE WITH ALCOHOL

18. How did your drinking habits change from high school to college? (Circle one.)

1. I don't drink alcohol and I never have *(skip to question 22)*
2. I started drinking in college
3. I am drinking less in college
4. I am drinking more in college
5. I stopped drinking in college
6. No change

19. Think back over last semester. During a typical two week period, how many times did you have *5 or more drinks(men) or 4 or more drinks (women)* in a row? (Circle one.)

0. None
1. Once
2. Twice
3. 3 - 5 times
4. 6 - 9 times
5. 10 or more times

20. What factors influence how much you drink on a given occasion? (Circle all that apply.)

1. As a reward for working hard
2. To fit in
3. To feel more comfortable in social situations
4. If everyone else is drinking
5. If it is free or cheap
6. If it is a special occasion
7. If I'm having a bad day or got a bad grade
8. To lower my inhibitions about having sex
9. To get away from my problems and troubles
10. To get drunk
11. None of the above

21. Since the beginning of the school year, how many times have any of the following happened to you as a result of your own alcohol use? (Circle one response for each.)

1 = Not at all **2 = Once** **3 = Twice or more**

I have missed or performed poorly in class	1	2	3
I have been confronted by a residence hall staff member	1	2	3
I have had a hangover	1	2	3
I have become sick or vomited	1	2	3
I have passed out	1	2	3

21. (continued)

I have had memory loss or blackouts	1	2	3
I have physically harmed myself or another person	1	2	3
I have caused a disturbance (i.e., been noisy)	1	2	3
I have damaged property	1	2	3
I have had unprotected sex	1	2	3
I have received a citation or been arrested	1	2	3
I have regretted getting sexually involved with someone	1	2	3
I have coerced another person into being sexual with me	1	2	3
I have been ashamed by my behavior	1	2	3
I have had a conflict with my roommate or another person	1	2	3
I have fallen behind in my studies	1	2	3
I have regretted losing control of my senses	1	2	3

22. Since the beginning of the school year, how often have you experienced any of the following because of *others'* drinking? (Circle one response for each.)

1 = Not at all 2 = Once 3 = Twice or more

I have been harassed, insulted, or humiliated	1	2	3
I have had a serious argument or quarrel	1	2	3
I have been pushed, hit, or assaulted	1	2	3
I have had my property damaged	1	2	3
I have had to "babysit" or take care of another student	1	2	3
I have had my studying or sleep interrupted	1	2	3
I have experienced an unwanted sexual advance	1	2	3
I have been the victim of sexual assault or date rape	1	2	3
I have been inconvenienced from vomit in the hallway or bathroom	1	2	3
I have been affected by the behavior of guests who are drinking	1	2	3

FUTURE ACTIVITIES

23. Which of the following activities do you plan to participate in while in college that you have not participated in yet? (Circle all that apply.)

1. Practicum, internship, field experience, co-op experience, or clinical assignment
2. Community service, volunteer work, or service learning
3. Research with a professor
4. Taking a leadership position
5. Study abroad
6. Independent research
7. Self-designed major
8. Culminating senior experience (e.g., capstone course, thesis project, comprehensive exam, etc.)
9. None of the above

OVERALL SATISFACTION WITH COLLEGE

24. Indicate the extent to which you agree or disagree with the following statements. (Circle one response for each.)

1 = Strongly disagree 3 = Agree
2 = Disagree 4 = Strongly agree
9 = Don't know/Never thought about this

I feel comfortable on campus	1	2	3	4	9
My college/university is supportive of me	1	2	3	4	9
If I had to do it over again, I would choose the same college or university	1	2	3	4	9
I feel that I am a member of the campus community	1	2	3	4	9
I feel a sense of belonging to the campus community	1	2	3	4	9

25. How satisfied have you been with each of the following aspects of your academic experience at your college or university? (Circle one response for each.)

1 = Very dissatisfied 3 = Satisfied
2 = Dissatisfied 4 = Very satisfied

The intellectual quality and challenge of the classes I have taken	1	2	3	4
The size of my classes	1	2	3	4
The relevance of the course material to issues that are important to me	1	2	3	4
The opportunity to get into classes that I really want to take	1	2	3	4
The amount of effort I am putting into my courses	1	2	3	4
The amount of interaction between instructors and students	1	2	3	4
The quality of relationships with my instructors	1	2	3	4
The quality of relationships with college/university staff members	1	2	3	4
Your overall satisfaction with this college/university	1	2	3	4

26. Do you plan to return to the same college or university next fall? (Circle one.)

1. Yes
2. No, I am graduating this year
3. No, I am enrolling at a different college or university
4. No, I will not be pursuing any form of education next fall
5. Undecided

BACKGROUND INFORMATION

27. What is your gender? (Circle one.)

1. Male
2. Female
3. Transgendered

28. Please indicate your sexual orientation. (Circle one.)

1. Bisexual
2. Gay or Lesbian
3. Heterosexual

29. Please circle the one response that you think best applies to your race/ethnicity. (Circle one.)

1. African American/Black (not of Hispanic origin)
2. Asian or Pacific Islander (includes the Indian sub-continent)
3. American Indian or Alaskan Native
4. Hispanic/Latino (Spanish culture or origin)
5. White/Caucasian (Persons not of Hispanic origin, having origins in any of the original peoples of Europe, North Africa, or the Middle East)
6. Multi-racial or multi-ethnic
7. Race/ethnicity not included above

30. Please indicate your citizenship and/or generation status. (Circle one.)

1. Your grandparents, parents, and you were born in the U.S.
2. Either or both your parents and yourself were born in the U.S.
3. You were born in the U.S., but at least one of your parents was not
4. You are a foreign born, naturalized citizen
5. You are a foreign born, resident alien/permanent resident
6. You are on a student visa

31. What is your current religious affiliation? (Circle one.)

0. None
1. Buddhist
2. Christian (e.g., Catholic, Protestant, etc.)
3. Hindu
4. Jewish
5. Muslim
6. Other: _____

32. What is the highest level of education completed by one or both of your parent(s) or guardian(s)? (Circle one in each column, if applicable.)

	Father or Male Guardian	Mother or Female Guardian
Don't know	0	0
High school or less	1	1
Some college	2	2
Associates degree	3	3
Bachelors degree	4	4
Masters degree	5	5
Doctorate or professional degree (JD, MD, PhD)	6	6

33. What is your best estimate of your parents' total income last year? Consider income from all sources before taxes. (Circle one.)

1. Less than $6,000
2. $6,000 to $9,999
3. $10,000 to $14,999
4. $15,000 to $19,999
5. $20,000 to $24,999
6. $25,000 to $29,999
7. $30,000 to $39,999
8. $40,000 to $49,999
9. $50,000 to $59,999
10. $60,000 to $74,999
11. $75,000 to $99,999
12. $100,000 to $149,999
13. $150,000 to $199,999
14. $200,000 or more

HIGH SCHOOL INFORMATION

34. What were your average grades in high school? (Circle one.)

1. A+ or A
2. A- or B+
3. B
4. B- or C+
5. C or C-
6. D+ or lower
7. No high school GPA

35. Please write your combined SAT and/or ACT score on the blanks provided. (e.g., 1 2 0 0)

SAT Composite ___ ___ ___ ___

ACT Composite ___ ___

COLLEGE INFORMATION

36. What is your current class level? (Circle one.)

1. First year
2. Sophomore
3. Junior
4. Senior
5. Graduate student
6. Other

37. What is your best estimate of your grades so far in college? (Circle one.)

1. 3.50 – 4.00
2. 3.00 – 3.49
3. 2.50 – 2.99
4. 2.00 – 2.49
5. 1.99 or less
6. No college GPA

38 Did you receive financial aid in 2003-2004 in the form of: (Circle all that apply.)

0. Not receiving financial aid
1. Loans
2. Need-based scholarships or grants
3. Non-need-based scholarships or grants
4. Work-study
5. Athletic scholarship
6. Other: _____

39. Is there anything else you would like to share about your residence experiences?

The next 4 questions will be customized for each institution.

Custom #1:
What is your current school/college of enrollment ?

Custom #2:
What is the name of the residence hall you are currently living in?

Custom #3:
Please specify which living-learning program(s) you have *ever* participated in while in college.

Custom #4:
Which living-learning program are you currently participating in? (Circle one response only.)

James L. Kohl
31 White Rock Hill Rd
Bow, NH 03304

October 26, 2009

Dr. Karen Kurotsuchi Inkelas
Benjamin Building
University of Maryland
College Park, MD 18042

Dear Dr. Inkelas:

I am completing a doctoral dissertation at the University of Maryland College Park entitled "The Association of Critical Thinking and Participation in Living and Learning Programs: Residential Honors Compared to Civic/Social Leadership Programs and Non-Participation in Living and Learning Programs." I would like your permission to reprint in my dissertation the:

National Study of Living-Learning Programs (NSLLP): 2004 Residence Environment Survey

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If these arrangements meet with your approval, please sign this letter where indicated below and return it to me in the enclosed return envelope. Thank you very much.

Sincerely,

James L. Kohl

PERMISSION GRANTED FOR THE USE REQUESTED ABOVE:

Karen Kurotsuchi Inkelas Ph.D.

Date: 10/24/09

Appendix B

UNIVERSITY OF MARYLAND
INSTITUTIONAL REVIEW BOARD

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March 18. 2009

MEMORANDUM

Application Approval Notification

To: Dr. Alberto Cabrera
James Kohl
Education Leadership, Higher Education and International Education

From: Joseph M. Smith, MA, CIM

IRB Manager

University of Maryland, College Park

Re: **IRB Application Number:** 09-0172

Project Title: "The Association of Critical Thinking and Participation in Living and Learning Programs: Residential Honors Compared to Civic/Social Leadership Programs and Non-Participation in Living with Learning Programs"

Approval Date: March 18, 2009

Expiration Date: March 18, 2012

Type of Application: Initial

Type of Research: Exempt

Type of Review for Application: Exempt

The University of Maryland, College Park Institutional Review Board (IRB) approved your IRB application. The research was approved in accordance with the University IRB policies and procedures and 45 CFR 46, the Federal

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